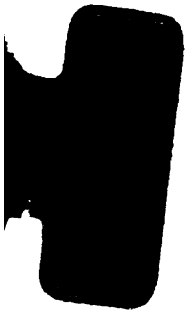

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PRACTICAL SUGGESTIONS
REGARDING THE
SELECTION AND USE
OF A PHOTOGRAPHIC EQUIPMENT

Written from *actual experience.*

Illustrations by Author.

CONTENTS.

AUSTIN K. HANKS

PUBLISHER AND AUTHOR

EAST ORANGE, N. J.

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Putting in a New Roll of Film.

Bausch & Lomb Zeiss Tessar lens series I C—4x5 Graflex camera. Subject in deep shade, about 10.30 A. M. Exposure $\frac{1}{25}$ second. Focal-plain shutter. Lens at *full* aperture F. 4.5. Bright day, later part of August. Seed L. Ortho plate. Reproduced from 8x10 contact platinotype print from an enlarged negative.

Illustrations by the Author.

AUTHOR'S NOTE

FOR the past few years we have come into considerable contact with various conditions of photography in general. The previous couple of years has particularly thrown us into a position which has brought us into personal relationship with a very large number of amateur photographers. This has included a large number of beginners; some of the "happy medium" variety, (who are "neither lukewarm nor hot") and, mostly amongst those whom we would consider as the real enthusiasts; these ranging from barely past the stage of "beginner," clear along the line to the truly "advanced amateur."

We have had any number of people ask us, "have you not, or can you not recommend some reference book which clearly and concisely tells how to *do* things? how to use a camera, etc., etc.,?" It is in direct response to this appeal that we set forth to prepare the manuscript for this work. In fact, the particular question or questions as quoted have been so large in number, and have been so genuine in their asking that we do not hesitate to say that it is *this* that has given us the incentive to press onward and forward until we really have, to the utmost of our ability, answered those particular questions.

At the outset, allow us to state that our greatest aim shall be, to be thoroughly *practical* and to give *solid information.*

Our personal idea in giving out information and in really being practical, is:—first of all to avoid to as great an extent as possible, all technicalities; second to relate *actual experience;* and, thirdly to be *specific,* to not only tell *how* to do things, but what to use in accomplishing the results attained. This shall be our aim.

In our endeavor to be specific and in really telling what we did and what we used, please understand us. It is not with a narrowness of mind, or a desire to "advertise" but one product. We specify as we believe that this is one of the essentials in being truly helpful. We fully realize that that there are other cameras and other lenses, besides those mentioned which *are* most excellent products, and those who read and seek for help, and are not narrowminded themselves, will adapt, relate and then apply the experiences as herein told as shall be of most benefit to himself or herself.

Our reason for presenting so many illustrations, is not to be only "profusely illustrated;" but to be additionally helpful by presenting a variety of subjects made under varying conditions and with different types of lenses and cameras thus showing the particular apparatus as best adapted for the particular subject as illustrated.

It is also our desire to go a few steps further than the title indicates: i. e. "Practical suggestions regarding the SELECTION and USE of a photographic equipment." As indicated in the table of contents we shall also include "sections" telling how to compound a developer, the development of of a plate, and the making of prints. It is *not* claimed that this it the *only* or the *best* method to develop a negative and make a print. There are many other most excellent methods. But it *is* claimed that this is a very good one; more than that one that is equal, (not necessarilly better) to any other, one that has stood the test of more than five years of continued use. The original negative, (plate or film) of *each* and *every* illustration contained herein was *made by the author,* and with the developer, and by the method of development as described in sections six and seven, with exceptions as noted.

The "Haunted Tower"—San Juan, Puerto Rico.

Bausch & Lomb Zeiss Tessar series II B—5x7 Cycle Graphic camera. Exposure $\frac{1}{25}$ second, stop F 8. Volute shutter. About 3 P. M. February, light clouds. Seed L. Ortho plate. Reproduced from contact Platinotype print.

To read a book without first reading the preface is like sitting down to a dinner with the principal factors omitted, the roast beef and potatoes, so kindly do not commence to read this unless you have previously read the "Author's note".

SECTION I.

BRIEFLY stated the classes of cameras and lenses may each be divided into three. Cameras: first the "Kodak", second the tripod camera, third the "Graflex".

Lenses:—first, the general "all around lens;" that is, the lens that will best do the greatest amount or greatest variety of work. Second, the lens made and specially adapted to high "speed" photography, and the making of instantaneous exposures under *un*favorable conditions. Third, the medium wide angle and the extreme wide angle lens.

It, perhaps would have been better to have said that the classes of cameras and lenses which we shall include in our present consideration may each be divided into three. There are, of course other types, or classes of both; the process camera, the enlarging and reducing camera, the professional portrait studio camera, the camera for photo-micrographic work, etc. Then, the process lens, the specially corrected apochromatic lenses for process color-plate work, the projection lens, condensing lenses, lenses specially constructed for photo-microscopy; and, perhaps one of the most important of all, the modern portrait studio lens. However none of these particular types will be dealt with as we believe that a thorough digest of the cameras and lenses as first specified will be ample and will quite fully meet the requirements of all those to whom this work is designed to reach.

SECTION II.

THE *Selection of a Camera and lens.*—This at best is far from being an easy question to satisfactorily answer. There are however, a number of elementary factors which enter into consideration and we believe that by taking these separately and independently and carefully considering them we will arrive at a conclusion which may prove a decidedly helpful guide to a large number. This at least shall be our utmost endeavor. In order that we may be consistant to a full degree, we shall take up and consider the selection of a camera and secondly of a lens, treating each apart from the other, and in detail.

One of the very first questions to ask regarding the selection of a camera is: "For what purpose do I really want it?" To this, one might quickly answer: "The camera that will permit the largest possible range or variety of work." Do we—really? Now let us see. Suppose we sift our question down a bit and then ask ourselves: "For what purpose do I want to *MOST* use my camera?" Ncw we have a specific question, one which, perhaps, we can really answer. There are, however, conditions or rather questions which should be considered along side of our "specific" question. Is expense an item? Is bulk and weight an item? What size do I want? Do I want to use either plates or films *exclusively*, or do I want to be able to use both plates and films? Will the question of cost of supplies, or rather the cost of maintenance be an item or not? Do I really want to be able to do anything and everything, to be thoroughly equipped, photographically speaking? Is it possible to get one outfit that will do everything? What do I *really* want anyhow, what do I, sincerely and truly, *MOST* want to be able to do? Now,—after all of this, where are we at,—in a muddle or not? Let us see—First, let us get it into our head once and for all, that it is most decidedly *not* possible to get any one camera that will do "everything," and do it well. It is possible on the one hand to get a camera that will do a greater variety of work than some other; and on the other hand to get a camera that will unquestionably do a certain class of work infinitely better than any other. If we want to be able to do "*everything*" then we

The Capitol, Washington, D. C.

Made with B. & L. Zeiss Protar series V—4⅜ in. focus. 5x7 Cycle Graphic Camera. Stop F. 45. Exposure (with cap) 2½ seconds. About 11 A. M. August. Bright sun. Seed Non-Halation Ortho plate. Reproduced from contact Velox ("Special Carbon") print. Good example of extreme wide angle out-of-door work.

Washington's Home, Mount Vernon, Va.

Made with B. & L. Zeiss Tessar series II B—8¼ in. focus. 5x7 Cycle Graphic Camera. Stop F. 16. Exposure ⅕ sec. Volute Shutter. About 1 P. M. August. Bright sun. Seed L. Ortho plate. Reproduced from contact Velox ("Special Carbon") print.

must have more than one outfit; but, do we really want to do "everything?"—I very much question it. If our outfit is to be for our own amusement, generally speaking "*no.*" In fact, the average person will find that one really good camera, carefully and thoughtfully selected will give a maximum of pleasure; and rarely will the amateur (unless he be in the ranks of the most advanced and exacting), require two or more outfits.

If for the purpose of making photography pay, or for earning money, possibly "yes." If for the purpose of earning a living, very probably "yes." However, we are not going to consider at all the earning of a livelihood with a camera, so the "probably, yes" is out entirely. If we have "a whole lot of money," and like to buy cameras and other photographic outfits, "just because we want to," or "just for the fun of it" then—most decidedly "yes." Not only two or three—but half a dozen or more. Why not? "The more the merrier" and, you can rest quite assured that neither the stock house or the manufacturer will be at all reluctant about accepting your "filthy lucre" and will not for a moment question whether it is tainted or not.

Is expense an item? This really applies more to maintenance than to the initial cost of the equipment itself. A *small* outfit that is *thoroughly good* is much more desirable, and will in the end give a greater total of real pleasure than will a larger and relatively cheaper one.

Is bulk and weight an item.? Generally speaking most decidedly "yes." Portability, compactness and light weight are ever very desirable features. However, do not go to the extreme in your wishes for a light and compact camera. Do not omit to consider quality of construction and durability. It is most needless to state that a well built and really durable camera weighing a few ounces more than its poorly constructed and flimsy neighbor, is the one to be preferred. Now-a-days one can purchase a camera that is thorougly good in construction and for all practical purposes of no greater bulk.

What size do I want, or what size is the most preferable to have? This

Sunset on the Miami, Miami, Florida.

Bausch & Lomb Zeiss Tessar lens, series I C—8¼ in. focus. 4x5 Graflex camera. Exposure $\frac{1}{125}$ sec., *full aperture* F 4.5 Focal plane shutter. Between 5.30 and 6 o'clock *in the evening.* Early March. Seed L. Ortho Plate. Reproduced from 16x20 Enlargement on Royal Bromide paper, sepia toned.

is indeed an important question. 3¼x4¼-4x5, 3¼x5½ and 5x7 are all very popular and very desirable sizes. The 3¼x5½ or 3a Kodak is perhaps the most popular of all the Kodaks and very deservedly so. The "3a" when fitted with Compound shutter and Zeiss lens is truly an ideal outfit. Construction of camera, shutter and lens are all simply perfect, compact to an extreme of cleverness, accurate to a nicety, a peculiar proportion of size that is just right, ability to produce quality of results that cannot be questioned, uses N. C. Roll film—daylight loading and unloading. What more could be desired as a truly ideal outfit? For the amateur, the *tourist* in particular, in fact for anyone the 3a is an outfit that may ever be heartily recommended. The 3¼x4¼ also the 4x5 as well as smaller and larger sized Kodaks are also made. The smaller should only be chosen where cost of maintenance is imperitive. The larger sizes, are generally speaking, too bulky and clumsy to give continued pleasure to say nothing of the cost of 4¼x6½ or 5x7 film. Where the "Kodak" is one's choice, you can be quite sure that you'll never go astray in selecting the 3a as it truly is *the* Kodak of Kodaks.

As a rule, 5x7 is the maximum size that is really practical for the amateur. This is quite sufficient to satisfy the requirements of exacting workers, and unless commercial work is to be undertaken, nothing larger should be selected. Where a tripod camera is your choice, we would select the Cycle Graphic as being *the* camera. Of course, 5x7 is a very desirable size, but it is well to remember that 5x7 is by no means over light or too compact, and also that 5x7 plates and paper if used in quantity will run up bills that will amount to considerable. The most popular sized tripod plate camera is 4x5. This seems to be the ideal selection, it is not too small, is not over heavy or cumbersome, the cost of maintenance is just about a healthy normal and most of all, 4x5 plates are so very standard a size that they can be purchased practically anywhere and everywhere where photo supplies are to be had. This last is indeed a very great consideration to the one who travels.

If the Graflex camera be your choice, then the 4x5 is undoubtedly the size

that is *IT*. The "Auto" also the "Revolving Back" are deservedly the popular models of this camera; the "Auto" very probably the more so of the two. The "Auto Graflex" is more compact, lighter in weight and costs considerably less than the "Revolving Back;" the latter has, however, a revolving or reversible back and a considerably longer bellows capacity, these two features deserve consideration from the really serious worker; but, generally speaking for the person who buys a Graflex solely for their own amusement or pleasure the "Auto" will, as a rule, entirely fill the bill. It is our personal opinion that plates are *the* thing to use with a Graflex, particularly with a magazine plate holder; however, there is an attachment known as the "cartridge roll holder" by means of which roll film may be used when desired. Then for the chap who is stubborn and will have nothing but film, the manufacturers have made a Graflex known as the 3a using 3¼ x 5½ N. C. roll film, this size being the same as the 3a Kodak. 3a films are like 4x5 plates, they also may be purchased anywhere, a point very well to remember. The 5x7 size of the Graflex, excepting for press and commercial photography is usually well to keep shy of; for the two special purposes named it is possibly necessary, but at best is both heavy and very bulky, the older types of the 5x7 Graflex being nothing more nor less than small trunks both in size and weight.

Will the cost of supplies (film, plates, paper, chemicals, etc.), be an item or not? If so, and seriously so, then the 2¼ x 4½ or 3¼ x 4¼ size in either Kodak, tripod camera or Graflex is worthy of consideration. As a rule we would not consider a smaller size, as in the long run it would not prove of lasting satisfaction. We unquestionably believe either 4x5 or 3¼x5½ to be the ideal size, and cost of maintenance for either of these sizes is just about the "happy medium," in fact as before stated, a healthy normal.

Do I want to use either plates or films or do I want to be able to use both? This is not a serious question. The "Kodak" is, of course primarily a film camera, and our choice with the Kodak *is* film; but, plate adapters may be used when desired and may be purchased for practically any of them. The tripod camera also

the Graflex are on the other hand, primarily intended for use with plates. It is possible, however, to fit adapters for the use of roll film or film pack to either. We certainly, as a rule do not advise anything but plates for the tripod camera. Roll film, as before mentioned, may be used with the Graflex (our choice would be plates), and on account of lack of weight and no need of dark-room when reloading are possibly desirable when traveling. The 3a Graflex is a camera for the exclusive use of film. We repeat, this is not a serious question and our individual wishes may readily be complied with.

What do I really want, sincerely and truly, what do I most want to be able to do? That is the point. Having endeavored to thus carefully answer the questions of relative conditions let us once more ask our original specific question: What do I *MOST* want? The answer to this, that might fully satisfy one person, might not at all please another. In our endeavor to answer this question, we shall be just as broad minded as possible, and shall to the best of our ability point out the camera that will best do a certain kind of work, telling just what each is the best adapted for, and also to tell its limitations and then it shall be up to the reader to decide the class of work that really appeals the most to them individually and subsequently choose the camera best adapted to that choice.

I. The Kodak.—For compactness, portability and light weight this is unquestionably *the* camera. The lens and shutter *best* adapted for the 3a (or any other Kodak) for high grade work is without a doubt the Zeiss lens in Compound shutter. This outfit when so equipped is absolutely first class.

Instantaneous pictures may be made under all reasonably, favorable conditions.

As a camera to have with you on the little trips of pleasure; or an elaborate tour; in fact, as a camera to consider as an "ever ready companion" the Kodak is indeed admirably adapted and desirable. The shutter speeds are fast enough for all conditions with moderately few exceptions.

For record work in general, street scenes, the little bits here and there,

The Palms, Rockledge, Fla.

Bausch & Lomb Zeiss Tessar lens, series II B—8¼ in. focus. 5 x 7 Cycle Graphic camera. Exposure $\frac{1}{25}$ second, stop F. 8 Volute shutter. About 1.30 P. M. Latter part of February. Bright light. Seed L. Ortho Plate. Reproduced from 14 x 17 contact Gum print from an enlarged negative.

NOTE—The "Gum" print from which this illustration is reproduced has several times been valued at $50.00

indoor and out-of-door portrait work, the picturesque out-of-the-way places as well as the more accessible ones, in fact all of these may well be considered as within the range that may be accomplished with a Kodak.

On the other hand its limitations may be summed up as follows: It is not suitable for telephoto work or for the use of a long focus lens, such as the single combination of the series VIIa Protar for the reason that it has not sufficient bellows capacity.

It is not suitable for the use of a high speed lens working at a relative aperture of F. 4.5 such as the I. C. Tessar. In the first place such a lens is too large in itself to be fitted in a Kodak and secondly an F. 4.5 lens is generally not suitable for use with film, taking this factor into consideration it is not adaptable for instantaneous work under unfavorable conditions of light i. e., the very early or late part of the day or on dark or grey days.

It is not adaptable for the use of more than one lens for the reason that the film is always exposed inside the camera and secondly that it has not a removable frontboard.

It is not generally adapted for architectural work where a large angle must be included in a confined or limited space, in fact a wide angle lens cannot at all be used, also for this reason it is not *generally* adapted for interior work, although some very excellent interiors may be made with the standard equipment where one has a large space in which to work or where a moderately medium angle will suffice. Right here let us state that no better choice could possibly be made as to size (i. e., focal length), of lens to be used with a given Kodak than those listed and regularly supplied by the makers.

The Kodak is primarily a hand camera and doubtless more than 90% of the work done with them is when they are so used; on the other hand they are entirely worthy of serious work in connection with the use of a tripod and one of the modern metal folding ones or the smallest size of the F. & S. "Crown" tripod is indeed a very desirable addition.

The Cottage Door.

Made with B. & L. Zeiss Tessar series II B—8¼ in. focus. 5x7 Cycle Graphic camera. Exposure $\frac{1}{25}$ second. Stop F. 8. Volute shutter. About 11.30 A. M. June. Good light. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

When film is used (and it is indeed exceedingly seldom that film is not used) it is not possible to focus with a folding pocket Kodak.

The varying distances of the subjects from the camera (which are to be photographed) must be calculated or judged by the one using the same, and the front-board and lens so placed or set to correspond with the specific condition at hand, there being a graduated scale on the Kodak for this purpose. This last mentioned feature is, however, not to be considered as a real limitation as with a little careful practice one may readily become quite expert in the judging of the varying distances, the scale being graduated in feet, one may very quickly set the lens at the proper distance for the particular occasion just previous to the making of the exposure. This judging of distance is not at all difficult with the 3a. It becomes considerably more so with a 4a (4¼x6½) or with a 5x7. On the other hand it is still less difficult with the No. 3 (3¼x4¼) or with the No. 1a Special (2¼x4½). The smaller the lens, or rather the shorter the focus the more latitude in the judging of distances for the reason that the varying separations in feet for different focus are closer together with a small lens than with a large one. For this reason, a little more than any other, we specially advise the 3a Kodak. If not this size then a smaller one in decided preference to a larger one.

II. The Tripod Camera.—This camera may undoubtably be used for a greater variety of purposes and may be adapted for use with a larger number of lenses and shutters to meet the requirements of varying conditions, than any other outfit.

There are several makes and types of this camera; the types may roughly be divided into two, the folding view camera, and the folding "hand" camera.

There are a number that may be considered as first class in construction and general workmanship such as the "Graphic," "Century," "Premo," etc. However, to be of the greatest practical value we shall confine our remarks to but one particular camera, the "Cycle Graphic," in order that we may be as specific as possible. This camera, in our estimation is the "ideal" of a tripod camera. Some

of its advantages may be summed up as follows: It is most excellently constructed; it is compact; it is relatively light weight (while perhaps a trifle heavier than some others, this is more than compensated for in its superior quality). It is durable and will indeed stand a maximum amount of wear and tear. It has a triple extension bed thereby giving a very long bellows capacity. It has a drop front with small supplementary track which may be used for wide angle work. It has rising and falling and side shift front with removable front board. It has revolving back. It may be equipped with two shutters at one time such as a "Compound" or "Volute" on the inside and a focal-plane attached at the back on the outside. It may be equipped with a series VIIa Protar of three foci with positive assurance that there will be sufficient bellows for the use of the longest focus of the single combination. It may be used with a telephoto. It may be used with a very short focus or extreme wide angle lens such as the series V Protar.

It is undoubtably better adapted for general architectural and landscape work, for copying and photographing small objects, for extreme wide angle work out-of-doors and interior views than perhaps any type of "hand" camera. It, of course, is primarily intended for use with a tripod; but, very excellent results may be obtained by using it without, by the use of a focusing scale, and particularly if the camera be fitted with a focal-plane shutter and a direct-view or "sure-shot" finder.

Its limitations.—With the *exception* of ultra rapid work, and what may be generally termed as "speed work," particularly when street scenes or little picturesque bits of life, such as market scenes, etc., are to be secured; or subjects which require very quick work at varying distances and perhaps under varying and sometimes very trying circumstances it has practically no limitations.

This camera may be used for indoor or out-of-door portrait work or groups, particularly if one has a high speed lens working at F. 4.5. For this purpose it is generally advisable to use a tripod. It, of course, may also be used for photographing children but for this purpose is perhaps not quite so well adapted as a camera of different type.

III. The Graflex may be considered, more than any other camera, to be in a class all by itself. It is, generally speaking, a special type particularly designed and adapted for a special variety of work. It is fitted with a focal-plane shutter and a reflecting mirror with ground glass at the top (also a hood which opens up), so that the image appears up to the time of exposure. The Graflex does away with all guess work as to calculating the varying distances of subjects from the camera. The location, as well as the size of the subject on the plate is seen the *full size* of the plate, the focusing done and the subject shown to the instant previous to the exposure.

As a camera for pleasure, a camera for real solid recreation, one that will continue to keep you fascinated with photography the "Graflex" is indeed the camera par excellence. This is equally true regardless of whether the work be done solely for one's own amusement or for a more serious purpose.

For photographing street scenes; rapidly moving objects; automobile races; racing or jumping horses; birds; animals; market scenes; life studies; studies of children at their play or otherwise; inaccessible subjects; in fact most anything and everything, that requires an instantaneous exposure and that the work must be done quickly, with the least possible consummation of time, regardless of the fact as to whether it is early or late in the day, or whether the intensity of the light is favorable or not, regardless as to whether the subject is four, eight, ten, twenty or more feet away from you, for a camera that is thoroughly capable of accomplishing all of this work, and doing it well, the "Graflex" is (in our humble opinion) the only camera.

The Garflex is a hand camera in the full sense of the term. A camera to be used quickly for quick work. On the other hand, however, the Graflex is admirably adapted for some classes of tripod, or other work which does not require "speed." In fact, we have seen some of the most exquisite little bits of landscape, and work done along the shore of a rocky coast or the edge of a lake, that were made with a Graflex.

The Lake, Central Park, New York City.

Made with B. & L. Zeiss Tessar series II B—8¼ in. focus. 5x7 Cycle Graphic camera. Exposure $\frac{1}{75}$ second. Stop F. 8. Focal plane shutter. About 12 o'clock noon. July. Good light. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

This is a good example of holding detail in deep shadow, particularly when working partly *against* the direct rays of the sun.

The Graflex is preferably a camera for use with plates. We specially recommend the use of the Graflex magazine plate holder. This is an attachment which fits on the back of the camera and contains twelve plates; the magazine remaining on the camera until the entire dozen or less are exposed thus giving but a single unit to carry and manipulate while working. The magazine is preferable to holders, and is more compact. Of course, additional magazines or plate holders may be carried where one wishes to be equipped for more than a dozen exposures at a single loading.

Daylight loading N. C. film may also be used with the Graflex by the addition of a "cartridge roll holder." A roll film holder is a nice thing to have in addition to a "magazine" for use on an extended trip. Personally we have such an outfit and have secured some very excellent results with the same although our general preference is for plates. Film pack may also be used in a "film pack adapter." We regret to say so, but we do not recommend the use of film-pack with the Graflex.

The limitations of the Graflex may quickly be summed up in saying that it is not, generally speaking, suitable for those classes of work for which the tripod camera is peculiarly adapted. It is not advisable for interior or exterior architectural work requiring a medium wide angle or an extreme wide angle lens for the reason that a lens such as the series V Protar cannot at all be used in the same. We do not recommend, usually, the VIIa Protar, nor do we advise a telephoto. As a rule the single combination of the VIIa would be too long for the bellows capacity of the Graflex and where the bellows capacity is sufficient, the lens itself its not fast enough (F. 12.5) for really successful instantaneous work.

To get the greatest amount of pleasure and practical use out of a Graflex we would advise as first choice for lens the series I. C. Tessar working at full aperture of F. 4.5. In connection with work with this lens when using it full open (or even at F. 5 or F. 5.6) we invariably advise the use of plates. For a 3a or the new Ia Graflex which uses roll film exclusively we recommend as first choice the

series II. B. Tessar. However, whereone has a Graflex fitted with an F. 4.5 lens and desires to use roll film, then we advise working only under generally favorable conditions of light and stopping the lens down to F. 6.3 and in some cases to F. 8. More detailed reason for this will be given later.

The selection of a lens?

This question may to a great extent be treated with a similar general consideration to that of the camera. Again, we may first ask ourselves for what purpose will I *most* want it? Of course, this largely depends upon what camera we have selected. Some lenses are peculiarly adapted to certain cameras; others may be used to excellent advantage on more than one camera, while some lenses may not be used at all, excepting on cameras specially adapted to their use.

It is our intention to give a concise synopsis of the lenses most suitable for varying classes of work; and having done this, we believe that we will then have answered our question by a further consideration of the lenses as best adapted for use with certain cameras.

Before proceeding to the actual consideration, allow us to state as before mentioned, that in endeavoring to be of the greatest possible help to the reader, it is our intention to be specific. The *lens* is really *THE* question of questions when considering the purchase of a photographic equipment. So many factors enter into consideration, pre-eminently that of *quality* of result, the quality of the negative and of the subsequent finished print, that, we shall confine ourselves strictly to the consideration of high grade lenses. There are a number of these made by various manufacturers. However, we shall consider only that series known as "Zeiss." This is not from a mercenary point of view, or narrow-mindedness, but entirely from the fact that we believe "Zeiss" lenses to be the best, and, also that they are made in a number of different types, thus offering perhaps, a greater variety to choose from than those of other make.

There are several series of the famous Zeiss objectives: Tessar II B, Tes-

sar I C, Protar VIIa, Protar VII, Protar V, Protar IV. Apochromatic Tessar VIII also Protar IIa for process work. Portrait Unar I B for professional portraiture. The three last will not enter into present consideration.

Now, to sub-divide these into the classes for which we should want to use them would be something as follows:

For focal-plane shutter exposures;—Tessar IIB, Tessar I C, Protar VIIa.

For focal-plane shutter exposures;—(Graflex) requiring exceedingly instantaneous work under favorable conditions, as well as instantaneous work under *un*favorable conditions; in the shade; very early or late in the day; dark cloudy days:—Tessar I C.

For general all-round work:—the one lens that will do the greatest variety of work:—Tessar II B, Tessar I C, Protar VIIa.

For landscape or other work requiring a lens of long foci at a speed not greater than F. 12.5:—Protar VII. Note:—Protar VII is one-half of, or, the single combination of Protar VIIa.

For portrait work:—Tessar I C, Tessar II B, Protar VIIa. Preferably however, Tessar I C.

For copying and enlarging:—Tessar II B, Protar VIIa, Tessar I C.

For use with telephoto attachment:—Tessar II B, Protar VIIa.

For medium wide angle work:—Tessar II B, Protar IV.

For extreme wide angle, exterior and interior work:—Protar V.

Having thus given a general idea of the lenses suitable for different classes of work we shall proceed to give them consideration from the point of view of the camera selected; also, additional suggestions regarding the lens best adapted for certain work.

I. The Kodak.—We have previously so fully considered its attainments and limitations that it will be quite sufficient to state that there is but one real choice

Foreground Study, Lake Champlain, N. Y.

Made with B. & L. Zeiss Tessar series II B—8¼ in. focus. 5x7 Cycle Graphic camera. Exposure 3 seconds. Stop F. 45. Volute shutter. About 8 A. M. June. Bright sun. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

This is a good example of use of very small stop, in out-of-door work, in order to secure great depth of field.

for the Kodak and that, is Tessar II B and, preferably when fitted in Compound shutter.

II. The Tripod Camera.—There are two first choice lenses for a tripod hand camera, namely: Tessar II B, Protar VIIa. By stating "first choice," we mean the *one* lens that is best adapted for general all-round work.

As before stated, Protar VIIa is composed of two lenses of Protar series VII. The series VII are constructed with four separate lenses, or pieces of glass, all cemented together and mounted in one cell forming a complete lens or "single combination" with a relative full aperture of F. 12.5. These lenses are made in various focal lengths from 7 3/16 to 39¼ inches. To make a series VIIa Protar we may take two lenses of series VII which are identical in foci, or two of slightly dissimilar, or two of considerably different foci. There are practically three lenses for each size of plate, for instance 5x7 has the No. 8 series VIIa composed of a 13¾ in. VII in the front, a 11 3/16 in. in the rear, and giving a doublet (the two combinations together) of 7 inches equivalent focus. The No. 9 composed of a 16⅛ in. (front) a 11 3/16 in. (rear) giving a doublet of 7½ inches. The No. 10 composed of *two* 13¾ in. (one in the front and one in the rear) giving a doublet of 7⅞ inches. The Protar VIIa when composed of two lenses of the *same* foci, such as the No. 10, gives a speed of F. 6.3 in the doublet, whereas the No. 8 with two combinations slightly different gives F. 7. and, the No. 9 with the two combinations of considerable difference in foci a still slower relative aperture in the doublet, or F. 7. 7. We thus see that although the full aperture of the single combinations (or series VII) are all alike (F. 12.5) regardless of their equivalent focus, that the speed (or full aperture) of the doublets (series VIIa), vary from F. 6.3 to 7.7.

The VIIa Protar is, furthermore, a lens of symmetrical construction, that is the single combinations are identical as regards the manner in which they are made; and may be used separately for photographic work, giving either two or three lenses *in one*. Where the single combinations are alike we have two lenses in

Along the North Shore, Long Islana, N. Y.

Bausch & Lomb Zeiss Tessar lens, series II B — $7\frac{1}{16}$ in. focus. 5 x 7 Cycle Graphic camera. Exposure $\frac{1}{25}$ second, stop F 6.3 Compound Shutter About 2.30 P. M. middle of October. Heavy clouds, considerable wind. Standard Orthonon Plate. Reproduced from 16 x 20 enlargement on Royal Bromide paper, sepia toned.

one, and, only two for the reason that the front "combination" is the same as the rear; but where the single lenses are not the same we have three lenses or three different foci in the one lens.

There are lenses of other make which are symmetrical in construction and for which it is claimed that their single combinations may be used separately. This is true, and yet it is not true, their single combinations may be used, yes,—but how? By stopping them down to about F. 45 and giving a time exposure of nearly three seconds or so. They can only be used at full aperture for focusing, but not for the exposure of the plate. In fact, the series VII is really the only lens (or combination) made which can be *successfully* used at full aperture for the actual exposure.

As we have already seen, the VIIa when composed of two series VII of the same foci, gives us a doublet working at F. 6.3. The series II B Tessar also has a full relative aperture of F. 6.3. What then is the difference? For all general purposes, as *doublets* there is no difference. They are, practically the same. Which, then, is the better of the two to choose? Just this: the II B Tessar is not a lens of symmetrical construction, its front half (or combination) is composed of two lenses (or pieces of glass) separated by an air space, and its rear half (or combination) is also two lenses (or pieces of glass), but cemented together. This gives a total of four lenses (or pieces of glass) as a complete whole which may only be used as such. The II B Tessar may only be used as a doublet and it is thus but *one* lens, whereas the VIIa Protar may be either two or three lenses in one. What, then, is the advantage of one lens over the other. As doublets, none. The Tessar is a little the gainer in price as it costs somewhat less than the VIIa Protar. We again repeat, the two lenses as *doublets*, are for all practical purposes, identical; but, only as doublets. The VIIa Protar is a lens without a competitor, it is the only lens made which has a single combination worthy of the name, giving three foci (or lenses of varying focus) in one, and for that advantage is worth every penny of what it costs. If the camera, of the tripod type, which you have selected be a Cycle

Graphic (or in fact any other camera with a long draw of bellows), then, first choice for the one "all-round" lens (the lens that will do the greatest range of work) should be the VIIa Protar. Now, you will ask which VIIa will I choose? Preferably one of dissimilar foci. The difference of F. 7 or even F. 7. 7as being relatively slower than F. 6.3 is really not material when used on a tripod camera for general all-round work.

On the other hand, if your choice of tripod camera, of either the "hand" or "folding view" type, be one of short or limited bellows capacity (i. e. a camera with a single draw of bellows), then your first choice of lens should be the II B Tessar, as under these circumstances it would indeed be folly to pay your good money for a lens which could not really be used, as would thus be the case in purchasing the VIIa Protar.

Now, you may naturally ask, what is the correct size or focal length for the one all-round *best* lens? This of course depends upon the size of plate used. Generally speaking the focus should not be *less* than the longest way of the plate or film and preferably from one-half to two inches longer. For 3¼x4¼, a lens of 4½ to 5½ inches equivalent focus. For 4x5, a lens of 5½ to 6½ inches; for 5x7 a lens of 7½ to 8½ inches equivalent focus, etc; the proportionate focus gaining a little as the sizes increase.

For use with a telephoto attachment not only is a long or very long draw of bellows required, and this in combination with the utmost rigidity, but it is specially required that the positive lens be of the highest type possible and for this purpose we recommend only the II B Tessar or Protar VIIa. The fact that either of these lenses is capable of giving a maximum amount of precise detail make them admirably adaptable for use with a telephoto. We most strongly do *not* advise fitting a telephoto to a I C Tessar (or any other lens working at F. 4.5). A larger relative aperture than F 6.3 in the positive, can never be used to give satisfactory results, to say nothing of the bulk and weight of the telephoto itself when constructed the required size of diameter to accommodate an F. 4.5 positive.

For portrait work with a tripod camera a I C Tessar would be an advantageous addition. It, however, is by no means a necessity as most excellent portraits

can be and have been made with Tessar II B as well as Protar VIIa. Tessar I C has, however, two decided qualities which are lacking in the other lenses just mentioned, the greater of which is increased speed, F. 4.5. This is almost twice as fast as F. 6.3. Short exposures are usually desirable in portrait work to say nothing of the other advantage of that peculiar "portrait quality" or slight diffusion of focus which may so readily be secured when and as desired, with a lens of large aperture.

Now, we come to something which is in the full sense of the word, special. This is work with a lens of very short focus. By this is meant not only wide angle, but extreme wide angle work; either out-of-door architectural subjects or interior views. For either of these we need not only a camera with a drop front and a special supplementary short track (or bed) which may be attached (as can be done with a Cycle Graphic), but we also need a special lens. This lens is the series V Zeiss Protar. With the Protar V we can readily secure an angle of from 90° to 110° and can do so with perfect covering power, evenness of illumination, entire freedom of spherical distortion, and in fact great freedom of distortion in perspective as well, if properly and carefully handled.

III. The Graflex Camera. There are three lenses which may be recommended for use with a Graflex. Protar VIIa, Tessar II B, Tessar I C. The choice as to which one is really best, depends somewhat upon what type of Graflex has been chosen.

If you have an "Auto" "Revolving back" or "Press" Graflex, and intend to use plates, then, first choice for lens would be Tessar I C and this, positively without further hesitation. Tessar I C is *the* lens when you really want to get all there is to be gotten out of a Graflex, i.e., to use it quickly for quick work. For portraiture, for work in the shade, for life studies or other difficult subjects, early or late in the day, for instantaneous work under *un*favorable conditions as well as ultra rapid work under more favorable conditions, this lens, without a question should be your first choice.

As we have already seen, Protar VIIa (when composed of single combinations of similar foci) is practically identical with Tessar II B. Both work at full aperture of F. 6.3. If you choose a 3a or Ia Graflex then our first choice would be

The Pines, Mount Manotonome, Hallstead, Pa.

Made with B. & L. Zeiss Tessar series II B—8¼ in. focus. 5x7 Cycle Graphic camera. Exposure ⅛ second. Stop F. 8. Volute shutter. About 3 P. M. October. Good light. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

II B Tessar. Both of these cameras are intended for the exclusive use of film. Also if your choice is "Auto" or "Revolving back" Graflex, and you intend to use roll film the greater portion of the time, first choice would then also be II B Tessar. The speed of this lens, F. 6.3 is fast enough for instantaneous work under all reasonably favorable conditions. However, the F. 6.3 Protar series VIIa is sometimes recommended and is quite often supplied with a Graflex. Personally, we would not recommend it except with the "Naturalist's Graflex" which has a very long draw of bellows and is intended for nature work. It would be absolute folly to fit one to an "Auto" as there is not sufficient bellows capacity for the use of the single combination. They may, however, be used on the 3a or "Revolving back," as with these models there is a sufficient extension of bellows. But, the speed of a single lens, F. 12.5, is *not* fast enough for successful instantaneous work and you will find that the same will seldom be used.

We have thus seen that for a Graflex where we use plates, our choice is I C Tessar, but where we use film II B Tessar. Why is this? For the simple reason that an F. 4.5 lens cannot be successfully used at full aperture with film. The diameter of the volume of light passing through an F. 4.5 lens is practically twice as great as that passing through one working at F. 6.3. This diameter or volume of light comes to a focal point upon the sensitive surface of the plate or film, and thus produces a picture when proper exposure and focusing has been done. But the forming of this focal point is at a considerably larger angle with a large aperture than with a smaller one, thus the difference in latitude between the plane of focus with an F. 4.5 lens as compared with F. 6.3. The I C Tessar when used at full aperture works at F.4.5. This, gives a large volume of light, but a point of focus which is very critical or precise. Any variation from this plane means diffusion or lack of detail, and successful results can only be secured where our sensitive surface is *absolutely flat*, as is the case with glass plates. With film it is rarely possible to obtain a *flat* surface. Film invariably has a tendency to pucker or roll in little waves, and even though this be comparatively slight, it will produce disappointing results. We could personally show films where both ends were perfectly sharp and the centre out; and, on the other hand, ones with good detail in the centre and the edges both out of focus due to using an F. 4.5 aperture.

For use with a 3a or other Graflex where roll film is to be used *exclusively*, our one choice is II B Tessar. But, what about the "Auto" or "Revolving back" where it is our intention to use *both* plates and film? What then? I C Tessar, of course. When using plates the diaphragm stop best suited to the occasion, full aperture, or stopped down a bit to F. 5 or smaller, depending entirely upon the intensity of the light, whether it be very poor, fair or very good; and when using film, work only under reasonably favorable light conditions and stop lens down to about F. 6.3. I C Tessar when stopped down to F. 6.3 is practically the same as II B Tessar when full open.

"Coons", Alexandria, Va.

Made with B. & L. Zeiss Tessar series II B—8¼ in. focus. 5 x 7 Cycle Graphic Camera. Exposure $\frac{1}{100}$ second. Stop F. 8. Focal-plane shutter. About 12 o'clock noon. August. Very bright light. Seed L. Ortho plate. Reproduced from contact Velox (Special Carbon) print.

SECTION III.

THE *Kodak and How to Use It.*—In giving a few suggestions as to "how to use a Kodak," we shall not tell how to put in a film or take it out, how to manipulate the shutter, or other purely mechanical operations of handling the instrument itself, all of which are told in detail and illustrated in the accompanying booklet when purchased.

Let us understand that we cannot "do everything" with a "Kodak." Like any other camera it has its limitations.

Before giving suggestions regarding its use, making exposures, etc., perhaps it will not be amiss to point out a few precautions which it is always well to observe.

First, be sure to see that the focusing scale and lock are *positively* accurate. To do this, remove the back of the Kodak, place a strip of ground glass (ground side in) on the little rollers over which the film is drawn, and setting the front-board of camera (containing lens and shutter) at 100 feet, carefully examine the image of some distant object (250 feet or more away) to see that it is perfectly sharp over all parts of the field; that is, over the entire opening of the back of the bellows of the camera, which is the total size of film or picture. If, upon so doing, the image shows perfect detail, the focusing scale is correctly set; if not, return the camera to the dealer of whom you purchased it or to the makers and see that it is properly adjusted.

The one thing to do *after* making each exposure is to turn the film to the next number. Make this a positive habit. Cultivate yourself and it will be worth while. Upon beginning to use a Kodak, if you will constantly remember that the *first* thing to do *after* each exposure is to turn the film, you will become accustomed to doing so and in time will do it intuitively and will no longer have to think about it. This will mean no double exposures (two exposures on the same film).

Another item of importance although it may seem trivial, is to constantly see that the front board is parallel with the plane of the film. The front board containing lens and shutter has a rise and lowering movement as well as a double side

Firing Salute, Hudson-Fulton Celebration
Naval Prade, Sat. Sept. 25, 1909, New York City.

Bausch & Lomb Zeiss Tessar lens, series II B—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{100}$ second, lens full open, F 6.3. Compound Shutter. 3 P. M. good light. Eastman N. C. Roll film, Tank development. Reproduced from 16 x 20 Enlargement on Royal Bromide paper, Sepia toned. **NOTE.** Enlargement was made from *part* of film only, an area about 2¼ x 3 inches.

shift. These may be used to advantage under certain conditions. Both have a centre mark, or a mark showing when the lens is in centre, and it should be seen that both are so set each time before pushing in the front board and bellows and closing the Kodak. If this is not done it will cramp up the bellows and force the front board out of adjustment, and if continued to be done, will so strain the front out of place that in time it will not be in its true plane when pulled out. If the front board is thus not parallel with the plane of the film it will cause the lens to give one part of the picture with considerably better detail than the other.

It is also very important to see that the thumb screw binding down the horizontal or side-shift movement upon the base which draws out on the track of the Kodak, be always set tight. If this is not done, the front board will be wabbly. The lack of attention of these two items are without a doubt a large cause of partial failure.

Practice alone can give the ability to accurately judge the distance of the object from the Kodak. After being quite sure as to the distance that a given subject is away when making the exposure the first thing to do, is to set the lock at that distance (6, 8, 10, 12, 15, 25, 50, or 100 feet), and then place the front tightly against the same. Too much cannot be said about being careful in this. An out-of-focus or "fuzzy" picture is very rarely desired, and in order to be positive that the results will always show good detail, we cannot too strongly urge the observing of this precaution.

Taking the 3a Kodak fitted with Zeiss lens and Compound shutter as the outfit in hand, we shall endeavor to give a few practical suggestions regarding exposure. The series II B Zeiss Tessar works at a full relative aperture of F. 6.3 (— U. S. 2.5). This is practically twice as fast as the Rapid Rectilinear lens, as regularly supplied with the ordinary outfit, which has a full aperture of F. 8 (— U. S. 4). It, however, must be remembered that the Tessar is *only* twice as fast at *full* aperture. When stopped down to F. 8 it is no faster; that is, it does not admit a greater relative volume of light than does the ordinary R.R. lens which is

S. S. Hamilton, Norfolk, Va.

Made with B. & L. Zeiss Tessar series II B.—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{100}$ second. Stop F. 6. 3. Volute shutter. 100 ft. focus. About 10.30 A. M. August. Bright sun. Eastman N. C. roll film, hand development. Reproduced from contact Velvet Velox print.

A Load of Melons, Norfolk, Va.

Made with B. & L. Zeiss Tessar series II B—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{50}$ second. Stop F. 6.3. Volute shutter. 50 ft. focus. About 11.30 A. M. August. Bright sun. Eastman N. C. roll film, hand development. Reproduced from contact Velvet Velox print.

This is a good example of retaining detail in both high-lights and shadow, at close range.

also F. 8 when full open. This is true of each succeeding smaller stop. Putting both lenses at F. 8 (—U. S. 4) or F. 11 (—U. S. 8) or F. 16 (—U. S. 16) and using the same shutter (to be sure that there may be no variation in the shutter speed), and giving a definite exposure at a *given* stop, one exposure being made with the Tessar, say 1/25 sec. at F. 8 and another exposure, 1/25 sec. with the R.R. lens full open F. 8 the two exposures on the film will be identical. This, as stated, is also true with the other stops. But, the Tessar is twice as fast, or practically so, from the fact that it has a larger relative *full* aperture. The Rapid Rectilinear lens work at F. 8, yes, very well, but that is its limit; it will not work faster. On the other hand the Tessar works at F. 6.3, and it is this fact, perhaps a little more than any other, that makes it a Tessar and for which you pay considerably more than for the ordinary one. People use a Kodak with the ordinary lens and get good results, in some instances very good results, at F. 8 (full open). In many more instances, when working under the best of conditions of light, still better results at F. 11. From this they get into the habit of "stopping down" whenever they can, and regardless of the fact that the film receives only one-half as much exposure with a given shutter exposure at F. 11 as it would at F. 8 they would much prefer a film that is undertimed and with detail at the edges than one that is, perhaps, fully exposed and with not nearly so much definition at the margin. This, then, is the object of using a smaller stop to get better covering power, more detail. People buy a Tessar and in many cases (and we have personally met a number of them) think that they must also "stop down" the Tessar to get results. This is not so. If it were, a person would certainly be foolish for paying out good money for one. Aside from the fact that it is anastigmatic, the ability to render vertical and horizontal lines sharp at the same time, Tessar is in the full sense of the word one of the very highest types of all high-grade lenses. It has an absolutely flat field (on the plate for which it is listed), and gives detail at *the edges* equal to that in the centre and does it at full aperture. In addition to giving equal detail over the field which it is intended to cover, it will give twice the exposure on the film as compared with the R.R. lens when used full open.

At the Old Dominion Docks, Norfolk, Va.

Made with B. & L. Zeiss Tessar series II B.—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{100}$ sec. Stop F. 6.3. Volute shutter. 100 ft. focus. About 10.30 A. M. August. Bright sun. Eastman N. C. roll film, hand development. Reproduced from contact Velvet Velox prints.

It is this; the fact that Tessar will produce first-class results without any stopping down that makes it a lens of so high a type, and in the actual making of the exposure, aside from the superior optical qualities, its full relative aperture of F. 6.3 makes it of value par-excellence.

You may ask: well if the ordinary F. 8 lens gives fairly good results, what is the advantage of F. 6.3? Just this—F. 8 is fast enough to give a fully-timed film at, say 1/50 or 1/100 part of a second under the best-of-light conditions, but under no other, and with even fairly good light intensity the heavy or dense shadows are almost invariably under-timed. Not so with F. 6.3. When working with a Tessar at full aperture, you will find that with good light you can secure a film that is quite fully exposed at 1/100 or even 1/200 second. In street scenes (or other views) where the light is good, but where the shadows are dense, there will be definition in them, and where the light is somewhat unfavorable, that although you may have a film that is a little thin, that it will have good detail and will make a very presentable print. In contradiction to this with the F. 8 R.R. lens the results would be little short of failure.

In working under very good conditions where there are dense shadows, such as a street scene in the Tropics, do not make the error of saying, "how bright the light is," and, judging your exposure accordingly, but rather "how dense, or how intense the shadows are," and make your exposure in proportion to the density of them. This is always a good rule.

The accompanying illustrations made with the 3a Kodak were all made with the II B Tessar. Some, however, were with the Volute shutter and others with the new Compound. Before further remarks concerning exposure, it may be of interest to make a few statements regarding the comparative merits of the Compound and Volute shutters. Both are good. Personally, however, we are inclined to favor the Compound with a little preference. The relative speeds, and the actual speeds of the various exposures as per the markings on the shutters, are decidely more accurate with the Compound than with the Volute. The iris dia-

Broad Street, Philadelphia, Pa.

Made with B. & L. Zeiss Tessar, series II B—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{100}$ second. Stop F. 8. Compound shutter, front-board raised up to its limit. 100 ft. focus. 11.30 A. M. May. Bright sun. Eastman N. C. roll film. Developed in Kodak tank. Reproduced from contact Velvet Velox print.

"Moses" Statue in front of Congressional Library, Washington, D. C.

Made with B. & L. Zeiss Tessar series II B--6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{5}$ second. Stop F. 16. Volute shutter. 15 ft. focus. About 3 P. M. August. Good light. Eastman N. C. roll film, developed by hand.

This is an excellent sample of close range work and use of small stop. Kodak on stationary support. Front-board raised up to its limit.

phragm in the Compound is separate from the shutter blades thus giving a *positive* aperture. The Compound attains a higher maximum speed, 1/250 second in the smallest size to 1/100 second with the largest, whereas the Volute attains but 1/150 down to 1/75 in the different sizes. The Volute, however, has slower automatic speeds as it gives automatic exposures of 1, 2 and 3 seconds in all sizes and the Compound nothing slower than I second automatically. This is not an important feature. The one great superiority of the Compound over the Volute is in its construction. It opens on the "star" principal, allowing the extreme edges of the lens to ***instantaneously*** transmit light, and we believe that there is absolutely no doubt whatever, but what the Compound will transmit a greater *actual volume* of actinic light, than will the Volute, during a given exposure. In other words, the Compound will produce or give more actual exposure to the film or plate, in 1/100 part of a second than will the Volute. This may appear to be a contradictory statement, but it nevertheless is a fact.

Returning to the question of what exposure to give with our 3a Kodak fitted with Zeiss lens and Compound shutter, we can do nothing better, in beginning, than to impress upon you the all-importance of exposing for the shadows or dense portions. For general all-round out-of-door work, in the open, street scenes, etc., with *very good light* between 10.30 A. M. and 2 P. M. from 1/100 to 1/200 second at F. 8. Reasonably earlier or later in the day than the time specified, full aperture, F. 6.3, 1/50 to 1/100 second. As a general rule, 1/100 second is sufficient speed, but there are occasions where we wish to secure something which is moving with fairly good rapidity whence it is necessary to give 1/150 to 1/200 second, but these highest speeds should only be given when required. Again, if the subject contains a larger portion of dense shadow, use the lens at *full* aperture. These specifications apply to work with good light, and when lens is set at 50 or 100 feet distant for subject, of course, requiring the same. On grey or clouded days or during November, December and January, when the actinic quality of the light is at its weakest, then invariably use full open lens (F. 6.3) and from 1/25 to 1/100 sec. exposure.

"Early Spring".

Made with B. & L. Zeiss Tessar series II B.—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{100}$ second. Stop F. 6.3. Compound shutter. 100 ft. focus. About 2.30 P. M. April. Good light. Eastman N. C. roll film, Kodak tank development. Reproduced from contact Velvet Velox print.

Road Scene—Speeding Auto.

Made with B. & L. Zeiss Tessar series II B—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{200}$ second. Stop F. 6.3. Compound shutter. 100 ft. focus. About 2 P. M. April. Good light. Eastman N. C. roll film, Kodak tank development. Reproduced from contact Velvet Velox print.

For work at close range, from 6 to 25 feet distant, and portraits, or other subjects out-of-doors in good light, the exposure would be at full aperture about 1/25, 1/50 second. In the *shade* from 1/25 to as long as ½ second depending upon the time of day and density of the shade. Peradventure, should we require a greater depth of field (and it is really only for this that there is any excuse to stop down a good lens to F. 16 or smaller), then we would suggest, at close range (6 to 25 feet), the use of a tripod, and at F. 16, an exposure of 1/5 of a second or more, again depending upon existing conditions and the quality of the light. Never make the error of trying to hold the Kodak in the hand and giving any exposure slower than 1/25 second. It is practically never possible to do so. Vibration (due to holding Kodak in the hand), and a blurred image, will invariably be the result.

For work out over the water in mid-summer, where the light is *most* intense, such as working from a moving boat, etc., then in the middle of the day we may stop the lens down to F. 11 and give 1/100 or 1/150 second. However, only use F. 11 under the condition specified for instantaneous work. Again bear in mind that for subjects well illuminated but with broad shadows that F. 8 or even F. 6.3 at 1/100 to 1/200 second would perhaps be the preferable.

We cannot possibly lay too much stress upon the advisability of sufficient, or rather a *full* exposure, and also upon the fact that the *lens* is good enough to produce results at full aperture (F. 6.3) and in using the Kodak in the hand, very rarely is it at all to be suggested that a smaller stop than F. 8 ever be used.

As a matter of convenience and also to avoid securing too much foreground the fitting of a "direct view" finder, properly adjusted, is a very excellent addition, as with one of these the Kodak is held upon a line with the eye. Also the rising front-board should be made use of, where more height and less foreground is required. This should always be done in preference to tipping the Kodak upward, as in so doing converging lines will be the result.

Made with B. & L. Zeiss Tessar series II B—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{100}$ second. Stop F. 6.3. Compound shutter. 15 ft. focus. About 3.30 P. M. June. Good light. Eastman N. C. roll film, Kodak tank development. Reproduced from contact Velvet Velox print.

A good example of close range work at full aperture.

At the top of Mount Beacon.

Up the Hudson.

Made with B. & L. Zeiss Tessar series II B—6⅞ in. focus. 3a Kodak. Exposure $\frac{1}{200}$ second. Stop F. 8. Compound shutter. 100 ft. focus. About 12 o'clock noon. June. Bright sun. Eastman N. C. roll film, Kodak tank development. Reproduced from contact Velvet Velox print. Made from Hudson River Day Line boat.

SECTION IV.

THE *Tripod Camera and How to Use It.*—We have already pointed out the fact that the tripod camera is, first of all, primarily intended to be used with a tripod; secondly, that perhaps it will do a greater range of work than any other, and third, that it is more readily adaptable for use with different types of lenses, and lenses of varying foci than any other kind of photographic apparatus.

As stated, the particular tripod camera that it is our intention to consider is the "'Cycle Graphic." This camera, has several very desirable features, some of which may not be obtained in others. It is, perhaps, the best-built camera of its kind. It is thoroughly well-constructed throughout. It is compact and very durable. The front board is particularly rigid, and absolutely parallel to the plane of the ground glass, a not only desirable but highly essential feature. It has a triple extension bed, giving a maximum bellows capacity. It may be fitted with a short extension track (dropping the front of the camera out of the way) for the use of a wide angle lens. It may very readily be equipped with an Auto Graflex focal-plane shutter.

Having thus decided upon the camera, we shall separately take up its use with the different lenses which it is possible and practical to use. This will include the following: The general "all-round" lens. The long focus lens or lenses of single combination. The telephoto attachment. The wide angle lens. The high speed lens.

The general "all-around" lens. This includes the series VIIa Protar and the II B Tessar. In a previous section we have quite fully gone over the comparative merits of these two, so that a repetition is entirely unnecessary. We may, however, again point out the fact that as doublets, taking the II B at F. 6.3 and the VIIa (where the two combinations are the same) at F. 6.3, the lenses of course being the same focus, that for all practical purposes the two are identical. Again, we have already seen that the real difference, or rather advantage, of the VIIa over the II B is the fact that the VIIa is so constructed that we may use either of the single com-

Tobacco Plantation, near Caguas, Porto Rico.

Showing a large section of the 500 acres of tobacco cultivated under cheese-cloth cover. Distant mountains about twelve miles away.

Made with B. & L. Zeiss Tessar series II B—8¼ focus. 5x7 Cycle Graphic camera. Exposure ½ second. F. 22. About 3 P. M. Volute shutter. February. Good light. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

binations (or half of the complete doublet) and secure good pictures at full aperture, F. 12.5. Considering the fact that the Cycle Graphic has a long draw of bellows, we would without further hesitation select a VIIa as the one ideal lens for this camera. For the 4x5-size we would choose a doublet of about 6 to 6½ inches equivalent focus and for the 5x7-size a focus of from 7½ to 8½ inches. Also, if our pocket book could comfortably stand the strain, a Compound shutter fitted to the lens and an Auto Graflex focal-plane shutter fitted to the camera.

Let us now make some exposures. For general out-of-door work, street views, etc., we would use the doublet at from full aperture down to F. 8 and exposures of 1/125 second or longer depending upon subject, time of day and strength of light. For such work would the use of a tripod be advantageous? Most decidedly so; and, for the reason that the camera can be set absolutely level, the front board raised or lowered just exactly as may be required, and that we may secure that faultless spacing that only may be had each time when the apparatus is on a firm but adjustable support. This, in fact, is a rule that applies for all times.

For architectural and distant views where a maximum amount of depth of field as well as detail is desired, then we may stop our lens down to F. 16 or smaller and give an exposure of 1/5 second or more, depending upon the stop used and the conditions under which we are working.

For really instantaneous work, trotting horses, automobiles, work from a moving boat, etc., under *good* conditions of light, then, we may have the camera either on a tripod or not, (if from a boat or other moving object preferably *not*) and use the lens full open (or F. 8 at the smallest) and expose with the focal-plane shutter at 1/250 second or quicker, as may be required.

In some architectural work, it may be necessary to raise the front-board to its limit. Where this is necessary, it is well to stop the lens down to F. 16 or F. 22 in order to secure good detail over the entire plate, as in such instance a larger portion of the same is receiving the extreme marginal rays for the reason that the centre of the lens is considerably above the centre of the plate. It is also advisable to

Church Interior, Newark, N. J.

Made with B. & L Zeiss Protar series V—7 $\frac{3}{16}$ in. focus. 8 x 10 Cycle Graphic Camera. Exposure $\frac{1}{2}$ hour. Stop F. 32. About 10 A. M. March. Good light. Electric incandescent lights in altar were turned on for about five minutes. Seed Non-Halation L. Ortho plate. Reproduced from a contact Velox ("Special Carbon") print.

This negative was developed with "first developer" only. (Reg. stock solution 1 oz. diluted with 16 parts (ozs.) water, no added bromide. See sections VI and VII.)

keep the front-board parallel to the plane of the plate. But, there are occasions where even the maximum rise of the front-board is not sufficent and then in order to keep the plane of the plate in true level, or absolutely *perpendicular*, it is necessary to swing the front-bed of the camera upward as well. This, of course, throws the lens and front board off parallel with the plate; yet, the lines on the plate will still be true if it be positively kept perpendicular. In focusing it is best to so focus, with full open lens so that the top and bottom of the plate will be in equal diffusion. Then stop down to F. 45 or even smaller and give an exposure of 3 seconds or more.

The single combination of the series VIIa Protar is really, in effect, at least, a low-power telephoto. Taking one of these lenses, such as the No. 12 where the combinations are of considerably dissimilar foci the image with the rear combination alone, *from a given SPOT or point of view*, is practically half as large again as the image produced by the doublet, and on the other hand the image with the front combination alone (used in the rear of the shutter or barrel) is *twice* the size of that given by the doublet. These lenses are most excellent for landscapes; inaccessible subjects; in fact, anything where an increased size of image at a given distance is desired. Although the full aperture or speed of all of the single combinations (or series VII lenses) is but F. 12.5 and are of long foci requiring a considerable bellows extension, are, nevertheless, very simple to use and compute the correct exposure. F. 12.5 is F. 12.5 regardless of the focus. It is a relative aperture. Under good light conditions an exposure of 1/10 of a second may be given and a full exposure will be the result. To more fully explain: Suppose we were to make three exposures, on three different plates of the same subject from a given spot and in each case use F. 16 and give an exposure of 1/5 second making the first exposure with the doublet; the second with the rear combination alone, and the third with the front combination (only) in the rear, the exposures on the three plates would *all* be *identical*. Of course, the *actual* diameter of the opening of the diaphragm in the above three cases would *not* be the same. Far from it. But, the *relative* opening

Bethesda Fountain,
Central Park, New York City.

Made with B. & L. Zeiss Protar series VIIa. 5x7 Cycle Graphic Camera.

All three pictures from SAME position.

Top picture made with doublet, *full* aperture F. 7.7.—$\frac{1}{50}$ second. Volute shutter.

Centre picture made with rear combination only—full open F.12.5 exposure $\frac{1}{10}$ second.

Lower picture made with front combination only—full open F.12.5 exposure $\frac{1}{10}$ second.

About 11.30 A. M. July. Bright sun. Seed L. Ortho plates. Reproduced from contact Velvet Velox prints.

would be *the same.* For a VIIa Protar there are, of course, three separate engravings for the diaphragm, and providing the engraving be accurate and correct F. 16 is F. 16 regardless of foci; and with a given shutter exposure the exposure on the plate will also be the same.

The telephoto attachment is neither difficult to use or to compute the correct exposure. The first essential in using a telephoto is to have good conditions with which to work. A bright day with perfectly clear atmosphere and as free from wind as possible. Second, an absolutely firm and substantial tripod and a thoroughly well-constructed camera with a long draw of bellows. Vibration is the telephoto's greatest enemy. A breeze blowing against the bellows or a shaky apparatus are factors to positive failure. As can be seen from the above, the telephoto is not an instrument that can be used anywhere and everywhere, but it may nevertheless give a large amount of pleasure, and although limited in its use, is capable of being entirely practical. A thoroughly first-class positive element (a series II B Tessar or VIIa Protar), and also a good shutter (Compound or Volute) are also essential features.

The Bausch and Lomb telephoto attachment is very simple in its manipulation and construction. It is but a simple tube with the negative element (or telephoto lens) fitted at one end; the threads which screw into the flange of the camera situated in about the middle; a revolving collar, with graduations (3, 4, 5, 6, 7, 8,) denoting the times of magnification and separating the distance between the negative and positive elements, and an extension hood at the front end with correct threads in same to receive the positive lens in its shutter. Also a stationary dipahragm fitted about midway inside the tube.

To make an exposure with the telephoto we first calculate or rather determine the correct exposure for the subject at hand, with the positive lens *alone* at a given stop, and, then *simply multiply* that exposure by the magnification which we desire, using the same stop in the positive lens. We do not recommend the use of a larger stop than F. 16 with the positive. F. 22 or 32 would even, as an average, be the better to use. Suppose we desire to photograph a certain subject (take for in-

Tower, Madison Square Garden,
New York City.

Made with B. & L. Zeiss Tessar, II B—5 x 7—fitted with Telephoto attachment. Cycle Graphic Camera. Volute shutter.

All four pictures made from SAME position.

First picture made with II B Tessar only—NO telephoto F. 22— ½ second.
Second " " " II B Tessar & telephoto—3 power F. 22—1½ seconds.
Third " " " II B Tessar & telephoto—6 power F. 22—3 seconds.
Fourth " " " II B Tessar & telephoto—8 power F. 22—4 seconds.

NOTE—same stop in positive lens for all four. Exposures given are exact.
Made on clear day—practically no wind—sun under lightly clouded sky. About 11 A. M. Seed Non-Halation L. Ortho plates. Reproduced from contact Velvet Velox prints.

stance the one as illustrated), and, after examination, we decide that F. 22 is a sufficiently small stop to give good detail. We determine that with the positive lens alone at F. 22 and giving ½ second would be a full exposure. Always give a full exposure. This is a rule to never be deviated from. Now we desire to use a magnification of 3 times. Set the telephoto for this (which is the greatest separation between the two elements) and focusing with the positive at full aperture, stop down to F. 22 and give an exposure of 3 times ½ second or 1½ seconds.

We desire to make another exposure at 6 diameters. Again focus with full open positive, stop down to F. 22 and give an exposure of 3 seconds. Still another at 8 diameters, and with the same stop the exposure would be 4 seconds.

Probably the foregoing will meet with some opposition, particularly in literature already published, but we maintain that our statements are correct, furthermore, the illustrations are positive examples.

Peradventure, should any difficulty be encountered in obtaining sharp detail when focusing, the following may be of help. Set the telephoto at the times of magnification which it is desired to use, open the diaphragm of the positive to the largest stop and then focus to obtain as sharp an image as possible; having done this, while still looking on the ground glass, with one hand revolve the adjustable collar on the telephoto very slowly back and forth and it will then be easy to secure the greatest amount of detail possible. Proceed with exposure as already explained.

The wide angle lens. The series V Zeiss Protar is without a doubt the best of its kind.

To begin: what is a wide angle or an extreme angle lens? It is a lens of very short focus for the plate for which it is listed. Also, a lens of specially large covering power, or one that will *include* and *give* a large or wide angle on a *given plate.* A lens with a very large image circle, in proportion to its equivalent focus; free from distortion and having all the qualities of a high-grade anastigmat. Such a lens is the series V.

An old fashioned Living Room, Ridgewood, N. J.

Made with B. & L. Zeiss Protar series V—4⅜ in. focus. 5x7 Cycle Graphic camera. Exposure 45 minutes—(daylight only). Stop F. 32. Heavily clouded day. Early Spring. Seed Non-Halation L. Ortho plate. Camera not more than 4½ feet elevation from floor. Reproduced from contact Velvet Velox print.

All wide angle lenses are necessarily slow or have a small relative aperture, the largest stop of the series V Protar being F. 18.

The object of a wide angle lens is, of course, primarily to secure a large field or angle at a given distance. For architectural subjects at close range, where it is only possible to get a certain distance away, and for the securing of interior views.

The 5x7 series V lens is but 4⅜ inches equivalent focus. To accommodate such a lens on a 5x7-Cycle Graphic a supplementary track bed is supplied which may be readily attached when desired, the entire front of the camera being dropped down out of the way for the occasion.

One of the principal factors toward success when using this lens is careful and clever focusing. Always focus to secure the best *average* possible. In interior work this is paramount. In fact, it is rarely necessary to ever use a smaller stop than F. 22 or F. 32 when making interiors providing the focusing be carefully done. This is of additional importance as a smaller stop would necessitate an exceedingly long exposure.

Also be cautious to see that the camera is not set too high on the tripod. About 4 to 4½ feet is the correct height, as it is always well to never include too much top or ceiling.

As regards exposure, nothing definite can be said. The conditions of lighting, colors, spacing, etc., all vary to so great a degree that anywhere from a part of a minute to several hours may be required, even at the diaphragms specified. It may, however, be stated that as a rule a heavily clouded, grey or even a rainy day is to be preferred as under these conditions the light is not only more constant but far more evenly distributed, and work looking toward open windows or windows with raised shades is entirely possible.

When using a wide angle lens out-of-doors, in order to stop the motion of slowly moving objects, it is possible to use the lens full open (F. 18) and give an exposure of 1/5 second or even a little less when working with very good conditions of light.

An old fashioned Bed Room.

An up-to-date Kitchen.

Made with B. & Zeiss Protar, series V—4⅜ in. focus. 5x7 Cycle Graphic camera. Exposure 10 minutes, by daylight. Stop F. 32. Followed by pure-magnesium-blow-flash (about 1 oz. of powder.) Made on heavily clouded day. Early Spring. Seed Non-Halation L. Ortho plates. Reproduced from contact Velvet Velox print. "Prosch" Blow flash lamp. Above two prints were made by the Potassium Bichromate method as given in section VIII.

For general architectural work a stop of F. 22, 32, or 45, will more usually be given for the reason that the lens will very largely be used raised considerably above, off the centre of the plate. With these stops the exposures will be the same as with any other lens at the same *relative* stop, i. e., at F. 22—½ second, F. 32—1 second, F. 45—2 seconds; or more, depending upon the time of day, color and location of subject, intensity of light, etc.

For this class of work too much stress cannot be laid upon the importance of *always* having the camera absolutely level and true. An A 1 level properly placed is a requirement for successful results.

In a paragraph regarding over-exposures in Section VII is given an additional suggestion regarding wide angle work which may be of some help as well as interest.

High speed lenses or lenses of a maximum aperture of F. 4.5 while being entirely possible, would not be an addition as a rule that we would at all recommend. There are but one or two instances, which we can recall at the present, where such a lens would be advantageous to use with a Cycle Graphic camera. The first would be for general portrait work (specially when taking children), either indoors or out-of-doors in the shade, on account of the fact that very short exposures could be given. The second, would be for out-door work, very early or late in the day, or where the light was particularly poor and where it was *absolutely necessary* to give an instantaneous exposure in order to secure or rather to stop the motion of some moving object or objects. Further suggestions regarding exposures with an F. 4.5 lens will be found in the following, Section V.

The Old Homestead, Ridgewood, N. J.

Made with B. & L. Zeiss Protar, series VIIa—13 in. focus. 8x10 Cycle Graphic Camera. Exposure $\frac{1}{5}$ second. Stop F. 16. About 2 P. M. October. Bright sun. Seed Non-Halation L. Ortho plate. Reproduced from contact Platinotype print.

SECTION V.

THE successful use of a Graflex is largely a complete mastery of its mechanical details. It is, indeed, more than any other a camera to be used quickly, and for the securing of rapidly moving objects. It is a great outfit to have for one's own pleasure. While it is neither complicated nor difficult to handle it requires equally as much, if not a little more than any other, a reasonable amount of thought and careful attention.

To sum up in a nutshell, the Graflex is *particularly* adapted for that work for which a tripod camera is really *not* suitable.

The mastery of its mechanical details is a matter of practice and experience. At a first glance one is inclined to think, "how complicated," but this opinion is quickly cast aside.

To look at the plate giving the varying shutter exposures, one is apt to get a little bewildered. The focal-plane shutter, appears to be its most complex point. This need not be so. The present model of the Graflex focal-plane shutter gives a total number of twenty-four variations, inasmuch as there are six tensions and four apertures for the different speeds or exposures, but in actual work, one requires only a few, perhaps not more than six or eight in all.

Cleanliness is a positive requirement with a Graflex, in fact, it is indeed so with any camera. Personally, we never start out with a Graflex before going over it to see that all the working parts are carefully cleaned. Also the lens, it is most important of all that this be *absolutely* clean, and, next to the lens, to see that the surface of the reflecting mirror and also the ground glass where the image is seen, are both entirely free from dust.

The question of what lens is *best* to use with a Graflex has already been considered, and we have arrived at three decided conclusions. First, for the exclusive use of plates, I C Tessar. Second, for the exclusive use of film, IIB Tessar. Third, where both plates and film are to be used I C Tessar, using the film where the in-

Diving Horse at "Dreamland", Coney Island, N.Y.

Made with B. & L. Zeiss Tessar series I C—8¼ inch. focus. 4x5 Graflex camera. Exposure $\frac{1}{1000}$ sec., stop F. 4.5, *full* aperture. 3.20 P. M. July, bright sun. Seed L. Ortho plate.

Sea-Gull.

Made with B. & L. Zeiss Protar series VIIa—13 inch. focus. 4x5 Graflex camera. Exposure $\frac{1}{1000}$ sec., stop F. 6.3 full open. About noon, February, bright light, out over ocean.

Down the Bamboo Slide—"Luna Park"—Coney Island, N. Y.

Made with B. & L. Zeiss Tessar series I C—8¼ in. focus. 4x5 Graflex camera. Exposure $\frac{1}{800}$ second—stop about F. 6.3. 11 A. M. July—bright sun. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

tensity of the light will permit the use of stop F. 6.3 or F. 8 and, when the conditions of light are more adverse, then the larger or full open aperture and the use of plates. The reasons for these decisions have previously been given.

In the first paragraph of this "section" we stated that the successful use of a Graflex was largely a complete mastery of its mechanical details; and a little later, that this was a matter of practice and experience. Some fifteen or twenty minutes spent in finding out the why and the wherefore of the working parts and then plenty of practice is really the best method we know of, in order to become thoroughly familiar with the instrument itself.

The focal-plane shutter is a part of the Graflex, it is *built* in it. This type is perhaps the most efficient of any shutter made. The fact that the curtain drops across the *plane* of the plate only a fraction of an inch in front of it, and that the aperture, or width of the opening is constant insures an absolutely uniform exposure over the entire plate. It also attains a much higher maximum speed.

A little review of some of the experiences of the writer, during a trip through Porto Rico a few years ago may prove of interest. It was during the month of February when the sun shines every day and the weather is like so much clock work.

A pointer in taking market-scenes, I think, may at least be worthy of your attention. The Spanish, especially "the kids," are about as "nosey" a set of folk as I have ever seen, particularly when the attraction is an "Americano" and he endeavoring to make pictures. When you really see something in a market *you want*, just size it up, get your shutter ready, slide drawn, etc., and then pick out some object at a direct right angle, or a still greater *opposite* direction to the subject you really want, but which you think is very nearly the same distance from your camera as the subject which you wish. This gives you your focal point. Then deliberately continue to point your Graflex in this opposite direction, and in a few moments you will have a semi-circle of interrogation-points in the form of humanity, directly in front of you, and some of them not more than six inches from the lens, but—these few moments give you exactly what you wish; it gives a clear sweep from yourself to

No. 4 Chadwick Car.

No. 16 Locomobile (winner of the race,) driven by Robertson.
At the Vanderbilt Auto Race, Long Island.

Made with B. & L. Zeiss Tessar series I C--8¼ in. focus. 4x5 Graflex camera—Exposure $\frac{1}{1000}$ second, stop F. 4.5 *full* aperture. October 24, 1908—about 10.30 A. M., dull grey day—NO sun. Seed L. Ortho plates. Reproduced from contact Velvet Velox prints.

Note—Negatives of above, were developed in tank with two "first solutions" as explained in section VII. Time required for development about 1½ hours. Subsequent intensification with mercury. Negatives entirely free from "fog."

the subject you *do* wish, and, when the critical moment arrives, turn yourself quickly around and a press of the thumb secures the result desired.

In taking street scenes, where the streets were somewhat crowded, I found a similar method of work very advantageous. In all cases, be sure to have the mirror set, focal plane shutter wound and set, an unexposed plate ready and in place, decidedly previous to the making of, or even wishing to make, an exposure; in fact, I generally make a habit of doing all of the above after the making of an exposure; then I am always ready, without further thought. Use the lens at F 4.5 (wide open), F 5.6 or F 8, and vary the exposure from 1/125 to 1/300 of a second. When the light is not very intense, F 5.6 and F 4.5 with 1/125 or 1/150 second will be an excellent exposure. When the light was quite intense, and the shadows not too dense, F 8 with 1/125 second. These two exposures are sufficient for all subjects moving at an average pace, such as people, walking horses, etc., and 1/125 at F 8 (where the light will allow it), is infinitely superior to 1/300 at full opening, as the smaller stop, of course, gives an increased depth of field which is a decided gain. However, in the tropics do not let the intensity of the light fool you; time, in all cases where possible, for the shadows. I once tried 1/125 second out in the open, as an experiment, where I thought the light unusually bright and intense, at F 16. The result was a failure—no detail in shadows, the high-lights thin and the picture generally chalky. On the other hand you often wish a certain subject and the light is not very strong; but it is absolutely necessary to give not less than 1/125 second exposure in order to be sure that the photograph will not show a blur. In such cases an F. 4.5 lens proves itself a true friend; all that is necessary is to use full aperture, and a fairly exposed plate will be your reward. I have found very, very few subjects that require a greater speed than 1/300 second. For 1/300 up to 1/1000 (the shutter's limit), the lens is usually used wide open.

A point found after considerable experience with the Graflex is "advance focusing" and is useful when taking moving subjects of any character—approaching, passing across or receding from the camera. It is this:— we will suppose our

Shooting the Chutes at "Luna Park"—Coney Island, N. Y.

Made with B. & L. Zeiss Tessar series I C—8¼ in. focus, 4x5 Graflex camera. Exposure $\frac{1}{1000}$ second, stop F. 4.5 *full* aperture. About 2 P. M. July, bright sun. Seed Ortho plates. Reproduced from contact Velvet Velox prints.

subject to be an interesting native, with a large basket on her head, walking toward us up the street. We look in the Graflex and see her coming; she comes nearer and nearer; we focus with her as she approaches; she is nearly as large as we desire on the negative, but still continues to come nearer; now—when nearly, but not quite as large as we wish on the plate, we give the large focusing thumb-screw wheel a turn forward thus focusing in advance, and when the subject moves almost but not quite into focus, then, immediately press the thumb to *make the exposure* and the subject is in actual focus at the instant of exposure. The advantage of this is the fact that the critical focusing is done in advance, leaving the eye and the mind solely centered on the actual moment of exposure when the subject *itself* moves into the exact place which is the focal point by its *own movement.* However, it all must be done in less time than it takes to tell it. In objects moving away from you the movement of the focus would be the opposite to that just described, as in that case the lens would be advance-focused by turning same in advance toward the sensitive plate, instead of away from it. We feel positive that to those who may not already know of this method of "advance focusing," that it will prove of *real value.*

In traveling, one of the greatest objections to the use of plates is the lack of a suitable place for changing. In a town of any size, such as Ponce or San Juan, one is generally able to find and use some professional photo-studio. After traveling several thousand miles in a large number of places, I have yet to find a professional who did not have sufficient courtesy to grant the use of his dark-room for the few minutes required to change a dozen or two plates.

In small places and in interior towns, such as one finds in Porto Rico a dark-room can always be made in the following manner: Take a small four-legged table of the usual height, of about thirty inches, place the same against the wall of room, and, if possible, in a corner, and then take all the blankets, bed-quilts and coverings you can find and form the remaining sides required around and below the table. Our dark-room is already and the fun begins—that of arranging one's self in a position so as to be able to work and perhaps handle two dozen plates in a space two feet square. However, I have found from experience that the above is quite

The "Half-Moon," Hudson.Fulton Celebration,
Naval Parade,
New York City.

Bausch and Lomb Zeiss Tessar lens, series I C—8¼ in. focus. 4x5 Graflex camera. Exposure $\frac{1}{50}$ second, stop F 6.3 focal-plane shutter. About 1.30 P. M. latter part of September, Bright sun. Standard Orthonon Plate. Reproduced from 16x20 enlargement, Royal Bromide paper, sepia toned.

practical, and it really works well. A number of large thumb-tacks and a small candle ruby lamp prove useful accessories.

Many will ask, "Why not use a closet?" Certainly, if a suitable one can be found; but four-fifths of the time they will be "out-of-sight." I don't remember having seen one closet during my entire trip through the island.

Our equipment is a 4x5-Graflex of the reversible back type with magazine plate-holder attached and fitted with an 8¼-inch (F. 4.5) series I C Tessar. One may ask: "Why so long a focus on a 4x5 camera?" For the reason that on account of the construction of this model a smaller lens cannot be used.

We have stated that in actual work but few of the shutter "speeds" are required. This is so.

It is *always* best to use the high tensions. Whereas the ¾-inch slot and No. 6 tension gives the same exposure (1/160 second) as the ⅜-inch shutter aperture and No. 3 tension, the former is invariably the preferable of the two. In the first instance the width of the opening in the curtain is wider, but it passes across the plate at a higher speed (in *less time*), for the reason that the tension spring is greater, or rather stronger, and, whereas the *actual* exposure upon the plate is the same in both cases, with the No. 6 or highest tension, the *entire* plate is exposed in less actual time, thus reducing the possibility of the distortion of a moving object, to a minimum.

For general out-of-door work tensions No. 5 and 6 with ¾-inch slit giving 1/130 and 1/160th. second exposure respectively will probably be more useful than all others. 1/130 or 1/160 second is fast enough for all average street scenes and life studies. Do *not* use a quicker exposure than necessary. Compute the shutter *speed* that is to be required by the rapidity of the movement of the subject to be photographed. The very highest, 1/800 to 1/1000 second are only necessary for racing or diving horses, automobile races, shooting the chutes, running and jumping athletes, etc. We repeat, 1/130 or 1/160 second is ample for *all* average work, and it will probably be seldom that faster will be required. Never make the error of using the highest shutter exposures just for the sake of finding out how fast it

U. S. Marines, Hudson Fulton Celebration,
Military Parade,
New York City.

Bausch & Lomb Zeiss Tessar lens, series I C—8¼ in. focus. 4 x 5 Graflex camera. Exposure $\frac{1}{125}$ second, stop F 6.3. Focal-plane shutter. About 2.30 P. M. September. Sun shining, but taken partly against light, note heavy shadows. Standard Orthonon Plate. Reproduced from 16x20 enlargement. Royal Bromide paper, sepia toned.

can be used, or because you have a "high speed" lens and the light is very bright. This latter, is the source of a large amount of mistake and failure. With a Graflex and I C Tessar, the place to control the amount of exposure, or *volume of light* on the plate is *not* by "speeding up" the shutter but by the *use* of the *diaphragm in the lens.* An F 4.5 lens has of necessity a shallow depth of field. We have tried to impress the importance of the fact that F. 6.3 *is* fast enough for work under reasonably favorable conditions and an F 4.5 lens is most desirable from the fact that such an aperture is really what might be termed a *reserve power.*

When using the outfit in hand for work where 1/130 or 1/160 second is ample speed, and the light is good, stop down to F. 6.3; where the light is very good, down as far as F 8; but never lose sight of the fact that where possible to *always* gauge the exposure in proportion *to the shadows.* For successful work wherever permissible, give sufficient exposure for detail in the shadows.

For early or late in the day, results may be secured with full open, F. 4.5 lens and an exposure of 1/125 second. We have personally made exposures as early as 7.30 A. M. and as late as nearly 5.30 P. M. on a clear day and secured good results. This stop and exposure is particularly useful for work in the shade, life studies on the shady side of the street (and that is where they usually are), and work at very close range, etc. Also, when working on grey or cloudy days and for some portrait work indoors.

For photographing children at their play, cats or dogs at play, etc., then exposures of from 1/200 to 1/330 second are very useful, using diaphram stops from full open down to F. 6.3 depending upon the time of day and strength of light.

For certain work, bits of landscape, portraits indoors, subjects where a considerable depth of field is desired and thus a small diaphram stop required, or for securing a wealth of detail in some deep shade, then the slow exposures with the 1½ inch shutter aperture and tensions No. 1 to 6 giving from 1/10th. to 1/75th. second are often very desirable. These, however, should only be given when a tripod is used; as, it is not usually possible to give a slower exposure than

about 1/100 of a second with a focal- plane shutter when holding the camera in the hand, and be positive that no movement will show.

For indoor portraiture where an exposure of about 1/3 or1/4 second is required, even with a full aperture of F. 4.5 then the following may prove useful: Place the Graflax on some support (tripod or table) in the desired position, set the mirror (down) in place, release the tension spring to No. 1 and set the curtain at "O". This means an open shutter behind the set mirror. A press of the thumb releases the mirror and the curtain slowly drops closed thus giving about 1/3 second exposure.

For an exposure of 1, 2, or 3 seconds or for a time exposure proceed as follows: Set the curtain at "O" and turn the little disc, at the lever which sets the mirror, around to "T". This means that the curtain is open, and when the mirror is released that it will stay open. To make an exposure: slide has been drawn, mirror set and focusing of course all previously done, place the thumb of the right hand tightly against the mirror lever and press the left thumb against the release, and when ready, lift up the right thumb (letting the mirror up) for the time which it desired to make the exposure and then press the same down as far as it will go, remove both thumbs and an absolutely noiseless exposure has been completed. For indoor portrait work, where the light is not very strong, both of these methods are desirable. In either, it allows the study of the expression of the features without the usual unpleasant effect of looking directly at the person to be photographed for the reason that you are actually looking thru the camera (Graflex). In the former instance the exposure is over before you can say "Jack Robertson" and, in the latter, (from the fact that it is entirely without noise) can easily be given before one is conscious that the same has been done.

SECTION VI.

THE IDEAL M. Q. DEVELOPER.

FORMULA AND COMPOUNDING OF THE SAME.

Water (in large porcelain stew pan kept exclusively for this purpose, and heated to a temperature of 180-212 degrees)	2 quarts
Dissolve in the above, in order as given below:	
Sulphite of soda (dry)	5 ounces
Carbonate of soda (dry)	6 ounces

Metol	½ ounce Dissolved in water (cold)	1 quart
Hydrokinone	½ " " " " "	1 quart

After the sodas, dissolved in HOT water as given, have cooled, add the Metol (dissolved in water) then the Hydrokinone (dissolved in water). This gives a total of one gallon of solution. Add to this:

10% Bromide of Potassium solution ..... 1 drachm

The whole should be WELL stirred, and then immediately bottled in fresh, clean bottles (either 8-ounce or 16-ounce size), and put away in a cool place for future use. This we call "Stock developer" or "Stock developer solution."

NOTE. If Sulphite and Carbonate of Soda Crystals are used, use twice the amount as given. Where possible, it is advisable to use the dry C. P. Soda.

NOTE. Where possible it is also advisable and decidedly advantageous to use distilled water for making "Stock developer." If this cannot be done, water *well boiled*, will usually serve the purpose. "Hard" water must *not* be used; good results cannot be obtained if "hard" water is used.

NOTE. To make 10% Bromide of Potassium solution, dissolve 1 ounce of Bromide of Potassium C. P. in 9 ounces of water (preferably distilled).

NOTE. We particularly advise the use of "E. K." tested Anhydrous Sodas.

ACID HYPO

Hypo (crystals)	16 ounces
Water	64 ounces

ACID HARDENER SOLUTION.

Acetic Acid (Commercial No. 8)	16 ounces
Sulphite Soda (Dry C. P.)	1 ounce
Powdered Alum (pure white)	2 ounces

Add 1 ounce of "hardener" to ½ gallon of Hypo Solution (2 ounces to gallon). In Summer add 2½ to 3 ounces to gallon.

Group, U. S. Battleships, Hudson-Fulton Celebration,
Naval Parade,
New York City.

Bausch and Lomb Zeiss Tessar lens, series II B—6⅞ in. focus. 3a Kodak Exposure $\frac{1}{100}$ second, lens full open, F 6.3 Compound Shutter. 3 P. M., good light. Eastman N. C. Roll Film. Tank development. Reproduced from 16x20 enlargement on Royal Bromide paper, sepia toned. **Note**—Enlargement was made from part of film only, an area about 2¼x 3 inches.

SECTION VII.

NEGATIVE DEVELOPMENT.

1. EXPOSURE.

To expose a negative correctly is to give an exposure which will produce, (when properly developed) half tones, and correct relations between the highlights and shadows with the intermediate tones all well preserved (not flattened) between the highest highlight and the *deepest* shadow, and to retain those proportions in the negative when dry so that the delicate detail will absolutely *not* be lost in the print, (making a straight normal print, without "tricks" or "dodges") when using any of the "Special Velox," Plainotype or other papers.

To produce such an exposure, using the "Seed L-Ortho" 26 X (or other plates of similar speed emulsion) a very excellent rule is:— For U. S. stop 16 an exposure of 1/5 of a second or *plus*. By that, (and using the exposure mentioned) would be a building light in tone and without any heavy shadows at a distance of 50 feet or more, (an open landscape, etc.,) taken on a *clear* day, having the subject illuminated by direct *sunlight*, (i. e., having the camera placed so as to work *with* or nearly *with* the direction of the rays of the falling light) and between the hours of 11 A. M. and 2 P. M. By "plus" would be using the same subject, same time of day, same stop (U. S. 16,) same plate, etc., but taking the same on a clouded day the exposure would probably be ½ second; or, if the subject was a building dull red in color, (red brick in city, or building of dark color with large porch, etc., in the country) and taken on a dark, dull day, during the hours mentioned, the exposure might be one second, or if taken at say, 9 A. M. or 4:30 or 5 P. M. (Spring or Summer) the same subject on the same day with the same plate, same stop (U. S. 16) the exposure might be anywhere form 1½ to 3 or even 4 or 5 seconds. One can readily see that for general all-round, out-of-door work, (using a camera with tripod) that once a series of normal (correct or nearly correct) exposures are ascertained for subjects of varying types and when using U. S. stop 16, as a minimum that the exposure for U. S. 32, 64, 128, or 256 can be readily and ac-

curately computed. Where the correct exposure for U. S. 16 is 1/5 second U. S., 32 would be ½ second, 64, 1 second, 128, 2 seconds, 256, 4 seconds, etc. In endeavoring to correctly expose, always give enough exposure to FULL TIME for the shadows, taking care of highlights in development.

II. To under-expose is to give an exposure which produces what is termed an "under timed plate". Of course, a full timed or correctly timed plate is always the IDEAL where the subject and all conditions in general will permit; but, there are often instances where an under-exposure is not only advisable but absolutely necessary to attain success. In photographing children, the use of a hand camera (3a Kodak, etc.) for general work without a tripod it is necessary to use an exposure of 1/50 or 1/100 second to obviate a blur or the showing of motion. However, such an exposure should only be given under generally favorable conditions; i. e., on a bright, clear day and between 10 A. M. and 3 P. M. in Spring and Summer, or 11 A. M. and 2 P. M. in Autumn and Winter and generally using the lens at full open and *never* using a smaller stop than U. S. 4. (F. 8.) The average hand camera lens works at F. 6.3 at the fastest. For photographing moving trains, race horses, automobiles, street scenes, athletes, etc., it is always necessary to "under-expose" and is generally advisable to use a camera of the "Graflex" type with focal-plane shutter, as it is quite often that an exposure of from 1/250 to 1/800 or even 1/1000 second is positively required, even under the most excellent light conditions, and with a lens of the type of Zeiss Tessar. When photographing subjects in motion under *un*favorable conditions, conditions where the light is not good, or in the heavy shade of a street when making street scenes, or in the early morning or late afternoon, it is then advisable and oft-times absolutely necessary to have a "high-speed lens ", i. e., a lens working at F. 4. 5 such as the Zeiss Tessar series I C.

III. To over-expose is to give an exposure which is in reality an exposure of the plate to an *excess;* an exposure which is decidedly greater than that which would be termed "correctly timed" or even "full timed". In endeavoring to correctly expose, it is always well to *full* time but never to *over* time. There is but

one instance, (which at the present time can be recalled) where it is an advantage to purposely over-expose. That is in wide angle, out-of-door work; and, we will take for an illustration a large building in a rather crowded thoroughfare portion of a City, the lens is the 8 x 10 series V Zeiss Protar, the camera 8 x 10 and plate the "Seed" non-halation L. Ortho, (in order to well stand the strain of over-exposure;) the stop (the very smallest) U. S. stop 512 and the exposure anywhere from 15 to 40 seconds, according to subject, color and size of building, whether same is illuminated by direct sunshine, or taken on dull or cloudy day, and time of day, time of year, etc. The advantage gained by thus deliberately over-exposing, is microscopic detail from tip to tip, corner to corner of plate, thus permitting the use of extreme rise of front-board, and most of all that almost any number of people may pass (move) between the camera and building being photographed during the time of exposing the plate, and NONE of the moving objects will show (on the plate) due to the LONG *exposure* (in the procedure as mentioned) and thus not registering at all.

DEVELOPMENT.

In developing negatives, two solutions are used. The first solution is called the "weak" or "first" developer and is mixed as follows:

Water ..... (perferably distilled) ..... 16 ozs.
Full strength "stock developer" (as given in original formula) .....1 oz.

NOTE.—The pint of water should always be "tepid", in Winter 75 to 80 degrees; which will soon cool due to cold plates, cold trays, usually cool temperature of dark-room, etc. In Autumn and Spring, 70 to 75 degrees. In the Summer (real warm weather) not over 65 degrees as in the last case the atmosphere is apt to be humid, the temperature of the water 75 degrees or more, and it is often necessary to use ice to cool to about 63 degrees as the tendency is, that temperature of developer will increase during use, owing to usual heat of dark-room. Also NEVER use the first developer *more* than *once*. The pint as given has sufficient capacity for *one* 8 x 10 plate or its equivalent, but no more; i. e., two 5 x 7's or four 4 x 5's at one time; that is being placed in the solution at the same *time* and *not*, two 4 x 5's

Upper Falls, Ausable Chasm, N. Y.

Mdde with B. & L. Zeiss Tessar, series II B—8¼ in. focus. 5x7 Cycle Graphic Camera. Exposure $\frac{1}{160}$ second. Stop F. 6.3 (*full* aperture) Focal-plane shutter. About 2.30 P. M. June. Bright sun. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

at first, and then two more ten minutes later. Always throw out this solution when once used. It is also well to gently rub surface of plate with small tuft of cotton after being placed in "first developer" to insure cleanliness, thus removing air bells or particles of dust, also rock trays as much as possible.

The second solution is called the "coaxer" and is mixed as follows:

Full strength stock developer..... 16 ozs.
10% Bromide of Potassium solution..... 1 oz.

NOTE.—Temperature of this solution not important, anywhere from 50 to 65 degrees, but not over 65 degrees. The "coaxer" may be used several times, i. e., the pint as given has ample capacity for from 24 to 36, 5 x 7 plates, providing the same is not discolored and has been corked when not in use.

I. It will be readily seen that these two solutions are quite opposites, one to the other. It, however, is positively remarkable the absolute control one has over the negative during development when once the system has been mastered. First of all, bear in mind two *important* items: the "first developer" works only (practically so) on the shadows and not on the highlights, leaving the highlights, (where normal exposure has been given) too flat and too thin even after a prolonged development. The "Coaxer" works only on the highlights (practically so) thus producing *contrast* and is used to "build up" the highlights, to produce greater density or give *more* contrast, and does *not* develop detail in shadow. The quality of an "ideal" negative has already been somewhat defined. To produce an "ideal" negative by development, is to develop until an absolute wealth of detail is obtained in all of the shadows, and keeping the highlights so thin that detail in both highlight and shadow will *all* be retained and positively none be lost in *any* part of the finished picture when printed on "Velox" or other kind of paper. In a nut shell: the "ideal negative" is that which produces (without "tricks" or "stunts") the IDEAL print! In developing a plate which has been correctly exposed it is placed in the "first developer" and in from one to five minutes' time the DETAIL in the shadows will be fully developed; but in 99 times out of 100 the density of the highlight will be too little, the entire plate too "flat" and it is necessary to place the

plate in the "Coaxer" for from 30 seconds to 3 minutes to "build up" the highlights or to give more brilliancy; brilliancy to a nicety. The exact time to leave the plate in either solution can only be ascertained by actual test and experiment, but once it is *well* remembered that the first solution is to secure detail (wealth of detail), in the *shadow* (and when there is detail in the shadow, it is obvious that there must be detail in the highlight); and, that the "Coaxer" is to "build up" or give brilliancy to the highlights, one can in a reasonable time become an expert and really be very proficient in negative development by this system.

II. Under-exposure produces contrast. The greater the under-exposure the greater the *extreme* between the *correct* proportion of highlight and shadow, especially so when treated by "normal" development, but this *in*correct extreme can be overcome to a marked degree by the proper use of the developer. The under-timed plate is placed in the "first developer" (but the same must be tepid as previously specified) and allowed to remain there until all of the detail is developed in the shadows, in other words, until the shadows commence to "veil" and when the shadows do commence to veil you can rest quite assured that positively ALL of the detail in the shadow IS developed that was placed there by the exposure. During this development the plates should be kept in absolute darkness; (in a tank with the *top covered*, or in a tray with another tray over the same and kept well rocked.) The time required ranges from ½ to 2 hours for under-exposure; but, please remember that there is such a thing as *extreme* under-exposure, i. e., so little exposure given that no treatment *known* will produce a negative; and, if there is not a negative produced by two hours development, you had an "*extreme* under-exposure." The prolonged development as a usual thing, develops the highlights to a sufficient density so that no "Coaxer" at all is needed; should, however, the highlights be not quite dense or brilliant enough then the "Coaxer" is used for a very short time, say 10 to 45 seconds, to give just a little more strength to the same. In the case of severe under-timing (such as focal-plane-shutter-"Graflex" work) it is always advantageous to use a tank and place the plates in "first developer", (tepid as already described) but at the end of 15 minutes to throw off the entire solution, and

replace by a *fresh* (new) *tepid*, "first developer" and allow a total development of from ½ to 2 hours as already mentioned. The use of the two *tepid* "*first* developers" is also a great advantage in the development of negatives where the subject has been the interior of a room. In taking an interior, against the light, (toward a window) the subject contains a great degree of contrast, and by this method (positively *with-OUT* the use of any "Coaxer") very remarkable results may be obtained, where the exposure has been ample; but in all interior photography full timing is the rule for successful results.

III. Over exposure produces "flatness. The greater the over-exposure the *greater* the "flatness". In developing an over-timed plate, the entire image will come up very quickly in the "first developer" and should be taken out quickly (sometimes as little time as 10 seconds) and placed in the "Coaxer" for a prolonged time, (anywhere from ½ to 8 minutes) the "Coaxer" working on the highlights in much greater proportion than on the shadows; the result:—a negative of more density than would be considered "ideal" under *normal* conditions but a proportion that will produce (when properly printed) a print with pleasing brilliancy or "life", the prolonged action of the "Coaxer" on the plate having overcome to a marked degree the "flatness" usually produced by over-exposure. However, also, please remember that there is such a thing as *extreme* over-exposure, i. e., so great an exposure that no treatment *known* will produce a negative; and if you do not secure a negative by this method of development, you had an *extreme* over-exposure.

IV. "Stick at it" until you succeed, and you won't have to guess, but WILL know!

Columbian Rocks, Ausable Chasm, N. Y.

Made with B. & L. Zeiss Tessar, series II B—8¼ focus. 5x7 Cycle Graphic Camera. Exposure ***3 seconds.*** Stop F. 16. Volute shutter. About 3.30 P. M. June. Sun shining at top but very dark down in chasm. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

This is an excellent example of retaining detail in extreme shadow and bright high-light.

SECTION VIII.

VELOX PRINTING.

THE ideal print, is (as a general rule) the print (when made on "Velox" or any other paper for that matter) that contains proper proportionate *tonal values* and retains, absolutely, all of the detail in the deepest shadow, (none of it having been burned) and also in the *highest highlight;* no part of the print remaining pure white, unless there was actually something that was pure white in the subject at the time it was photographed. The above might be considered a good definition of *any* print that is truly "IDEAL". The parenthesis, "as a general rule" was not used without some thought; as, when we really sift it all down to the purely material, the "ideal" photographic print is mostly a matter of individual temperment and IDEA. For practically all architectual, interior photography and other "*straight*" work, or photography of a strictly "commercial" character, our definition would hold good, without any change whatever, but—when we delve into the realms of "high art", pictures "a la fuzzy-o-type", or, to be serious, the making of landscape, portrait, figure or "art" studies from a purely "pictorial" or "art" point of view, *then*, very often, the "ideal" print is the print which does NOT retain *all* the detail in *every part* of the picture. The "ideal" is really in such instance, the suppression of detail to the furtherance of bringing out an "*idea*," the making of an "impression," the making of a picture by the means of photography which will create or—give (regardless of the amount of detail either suppressed or retained) a finished result which gives to *another* the idea of the maker, (the artist?). That result would generally be considered "im-pressionistic" or "*art*".

To secure a print on "Velox" (or other developing paper) which will really retain absolutely all the detail in the deepest shadow and in the highest highlight as well, while preserving proper intermediate half-tones, is, as a rule, not an easy matter; yet there is probably no printing product which will so readily yield itself to the brain, or desire of the person using it while allowing a remarkable amount of

extreme in latitude of result, and between great contrasts or extreme softness, as will developing paper, when properly printed and developed with a proper developer.

Using "Velox" paper and the "Ideal" M. Q. developer "stock solution" as our two basic principals; the securing of these extremes of latitudes of varying results depend upon four factors and the variation of the same; namely: the grade of paper used:—the length of the time of exposure in printing:—amout of 10% Bromide of Potassium solution added to the "stock developer", ("stock developer" when making prints means FULL strength and *never* diluted with water) :—and, the length of time the print is allowed to remain *in* the developer.

Before proceeding with instruction as to *how* to secure the result desired by varying the four factors mentioned, we give a general idea of a simple, practical and complete outfit for handling of developing papers.

The printing light is rather important. Where possible one that will throw the light downward is preferred. Where electricity is available, a ball socket holding four 16 candle-power ground glass "apple" incandescent lamps fitted with a circular tin reflector above the same (barely far enough above so that lamps will not touch tin) and the whole suspended by a chain or cord and connected with a flexible "lamp cord" (electric) so that the same can be raised or lowered from or toward negative in printing frame, will, perhaps give the most general satisfaction. If electricity cannot be secured, the "Reflex" inverted Welsbach gas light is quite equal for the purpose. For developing, a good light either gas or electric is enclosed in a tin or galvanized iron lamp, with single 8 x 10 orange-glass fitted in the front, and placed about four to six inches above and back of shelf where developing tray is used, thus throwing a bright yellow light down on print while in tray during development. It is of course necessary to have lamp well ventilated with an elbow of tin tubing both below and above to allow a free current of air to pass through without letting out any white light. It is also advisable to have a tin hood project out in front and above the light, to protect one's eyes from direct rays.

For developing, a 5 x 7 porcelain tray (for 5 x 7 or smaller prints) contain-

ing developer is placed in front of the orange light. Directly back of this tray place an 8 x 10 tray filled with clean water for rinsing prints after development before placing in hypo. To the left of these, (or other nearby convenient place) put a large rubber lined or porcelain tray containing acid hypo bath. The acid hypo is that given in formula and is the same in every respect as that used for plates. The same *particular* hypo bath should *not* be used for both plates and prints. Keep on hand two baths just alike, using one exclusively for prints the other for plates. It is also well to have another small tray, say 8 x 10 filled with plain water for rinsing one's hands. For *washing* prints a large wood tray say 20 x 24 in. and 3 or 3½ in. deep, the same first painted with black asphaltum and then lined with rubber sheeting which has the corners turned in and not cut, is perhaps as economical and serviceable as anything for the purpose. At one end of the tray a cut of about ¾ of an inch from the top and 6 or 8 inches wide, allowing the rubber sheeting to lap outside the tray, (and not cutting the same) forms the outlet. The water is supplied to the opposite end by rubber tubing laid in the tray and connected with some nearby fawcet. Allowing the water to run for an hour and changing prints around several times during that time insures thorough washing. After washing, the prints are laid out (face up) on clean lintless blotters to dry, after being removed from the wash water and placed on a clean glass in a pile face down and the superfluous water pressed out. Or, a better way is to lay out separately, *face down*, on cheese-cloth stretchers. These may be constructed by making a frame work of light wood and tacking unbleached cheese-cloth tightly over the same. The cheese-cloth is first dampened with a wet sponge or cloth and the prints layed out on same *directly* from wash water. Prints dried in this manner will curl but a trifle. Do not dry prints BETWEEN blotters. They are likely to stick and cause much annoyance.

To determine when the print is thoroughly free from hypo, the following test formula may be successfully employed:

Permangate of Potash.....	8 gr.
Caustic Soda	7 gr.
Water (distilled)	8 ozs.

The shore at Port Kent, Lake Champlain, N. Y.

Made with B. & L. Zeiss Tessar, series II B—8¼ in focus. 5x7 Cycle Graphic Camera. Exposure 1/50 second. Stop F. 6.3 (*full* aperture) Focal-plane shutter. About 11 A. M. June. Bright light. Seed L. Ortho plate. Reproduced from contact Velvet Velox print.

Fill a glass with pure water to which you have added three or four drops of the potash solution. Then take a couple of prints from the wash-water and allow the water from the prints to drip into the glass. If hypo is present, the violet color of the water in the glass will change to a slight greenish tint. In such case return prints to the wash-water to remain until similar test shows that the hypo is entirely eliminated.

Presuming that we are ready to print, we will take up our first "factor"—the grade of paper used. "Velox" is made in a variety of surfaces and two grades known as "Regular" and "Special". "Special Velox" is made in the following surfaces:—Glossy, (enameled); "Velvet", (semigloss); Portrait, (smooth-matte); Carbon, (matte); Rough, (rough-matte); and "Royal" (semi-gloss cream tint body) The "special" "Velvet", Portrait and Rough are also made Double-weight. For preserving minute detail in machinery, interiors, architectural work, etc., the "Glossy" or preferably the "Velvet" is suitable. For portraiture, the "Portrait," "Rough" or "Royal" (the latter when re-developed) and preferably the double-weight papers for mounting in folders, un-mounted, etc. For some architectural landscape or other work of "artistic" character, the "Carbon" "Rough" or "Royal." It will readily be seen that the paper to use is a matter of individual wish and the adapting of a particular *surface* to suit the subject in hand and the purpose for which one wishes the finished print. The printing may be divided into three parts as follows:—

I. To make a print from a negative which is too "contrasty or too "chalky" in other words to secure a "softer" print than the negative would give under normal conditions. Use very little added Bromide i. e., 6 to 8 drops of 10% Bromide of Potassium in 8 ozs. of "stock developer". Leaving the developer thus, the result desired is secured by varying the exposure and the time the print is in the developer. For instance, supposing we have a negative and give the print an exposure of 1½ minutes and the same is fully developed after being in the developer 25 seconds. After placing the print in hypo and looking at the same we find it a little bit too "chalky". To correct this we give print an exposure of say 2½

minutes and allow same in developer for only 14 or 15 seconds, rinsing VERY quickly and *instantly* placing in hypo; the result will likely be that which we wish, —greater softness. In a nut shell: the longer the exposure of print and the shorter the time in developer the greater the amount of softness. The theory being—the very full exposure of print and excessively small amount of added Bromide allows the image to come up very quickly but simultaneously and the short time in developer (so short that shadows do not anywhere nearly fully develop) with lack of Bromide to hold back the highlights, produces from a too "chalky" negative, softness to a nicety. For this any of the "special" papers may be used. Do *not* use "Regular".

II. To make a normal print from a normal negative. Use any of the "Special" papers. Use "Stock developer" with 1½ to 3 drops of 10% Bromide of Potassium added to each fluid ounce. Expose print so that same will be fully developed when in developer from one to one and a half minutes. For a little more "softness" expose so that print will be fully developed when in developer 30 to 45 seconds. To secure a trifle more "brilliancy" or "snappiness" expose print so that same will be fully developed when in developer 1½ to 2 minutes.

III. To make a print with contrast; to print from a "thin" negative with fairly good proportions; to make a print from negative which is "flat" or both "thin" and "flat".

A. To print from "thin" negative with fairly good proportions, use any of the "*Special*" papers. Use "Stock developer" with from 5 to 20 drops of 10% Bromide of Potassium added to each fluid ounce. Expose so that print will be fully developed when in developer from 2 to 3 minutes. The greater the amount of Bromide (more than 5 drops to each ounce of "Stock developer") the greater the "contrast" when exposed so as to be allowed to remain in developer from 2 to 3 minutes.

B. To make a print from negative which is "flat" or both "thin" and "flat". Use any of the "*Regular*" papers. Use "Stock developer" with from 2 to 15 drops of 10% Bromide of Potassium added to *each* fluid ounce. Expose so that

print will be fully developed when in developer from 30 seconds to 2 minutes. Vary length of exposure, amount of added "Bromide" and length of time print is in developer until desired amount of contrast possible with the negative is secured.

IV.—Special.

To secure prints from negatives of *excessive* "contrast" or "chalkiness", the following method is quite equal if not superior to entire or local reduction of the negative.

The print is exposed fully for the dense portions, or highlights of the negative; the shadows or thin portions are cared for by the process. After exposure the print is immersed for from 30 seconds to 2 minutes in a weak solution of Potassium Bichromate, then thoroughly rinsed in a tray of clean water, then developed while rocking the tray vigorously and placed in fixing bath in the usual manner Full development of the print, (if properly exposed) should require 1½ to 2 minutes.

Any amount of softness can be secured at will in the INDIVIDUAL PRINT, while retaining detail in both high-light and shadow, by varying the strength of the Bichromate Solution, and the length of time the print is immersed therein, ½ to 1 dram of Potassium Bichromate in 16 ozs. of DISTILLED water is the normal proportion. It is better, however, to leave the print one minute in a weak Bichromate Solution than for 15 seconds in a stronger one. The water used for rinsing between Bichromate bath and the developer should be changed every third or fourth print. It is also advisable to use distilled water for this purpose.

More than the usual amount of 10% Bromide of Potassium Solution should be added to the "Stock developer" to insure clean whites. With care the prints will be entirely free from stain. Use fresh and chemically pure Bichromate of Potassium; also new trays and keep each tray for its purpose.

NOTE.

While over-exposure of the print with quick development, and under-exposure with prolonged development are both advantageous to secure a desired result, they cannot help but give a slight olive or greenish tone. A rich black, or blue black color can only be obtained when the normal or nearly normal method is used.

SECTION IX.

RE-DEVELOPING.

Sepia toning method for toning "Velox" or Bromide prints to a rich Sepia tone, and which if instruction is carefully followed is PERMANENT,—follows:

A Ferricyanide of Potassium C.P. (red prussiate..10 scruples
Water .....10 ozs.
When above is dissolved add 5 drops of Ammonia Hydrate.

B Bromide of Potassium C. P.....10 scruples
Water .....10 ozs.
When "A" and "B" are thoroughly dissolved they are combinded together and form "Solution No. 1".

C. (Solution No. 2).
Sodium Sulp*hide* (C. P. Crystals) ..... 5 scruples
Water .....20 ozs.

To tone prints: The back print after being thoroughly fixed and thoroughly washed in running water for an hour, is then placed in "Solution No. 1" until thoroughly bleached, (until no trace of black remains.) This requires about one minute's time. After this; the print, or prints are thoroughly rinsed in at least 3 changes of water and are then placed in "Solution No. 2", (the Sulphide bath) this bath will immediately produce the rich Sepia tone almost instantaneously. After the Sepia tone is secured (which requires but about 30 seconds' time) the print or prints are washed in running water for one half hour and are then laid out to dry in the usual manner.

NOTE.

If the black prints have already been dried, they are placed in plain water for a few moments until limp, then toned as previously described.

NOTE.

Be certain that Sodium Sulp*hide* is used, NOT Sulp*hite*.

NOTE.

If blistering of prints occurs, this is due to wash water being a different temperature, either too cool or too warm. Blistering may be entirely avoided by placing prints in a weak alum bath directly from Sulphide solution, leaving prints in the same for about a minute, then place in running water for 30 minutes as before stated. Alum bath is made by dissolving about ½ oz. powdered Alum in 16 ozs. water.

NOTE.

Be sure to see that positively fresh and pure chemicals be always used.

SECTION X.

Additional Practical Suggestions.

Properties of a High-Grade Lens.

In order to thoroughly test a lens, a test chart should be used. This should be placed upon some flat surface. The plane of the ground glass, the front-board containing the lens and the chart should all be absolutely *parallel* one to the other; and, the centre of the chart, the centre of the lens and the centre of the ground glass all in *one straight line.* All tests should be made with the lens at *full* aperture. The lens should show an absolutely flat field over the plate for which it is listed to cover. It should be free from astigmatism. Free from coma. Free from any kind of distortion, either spherical or marginal. Give absolute even illumination and most of all be capable of giving *precise definition* over the entire field; from edge to edge, corner to corner.

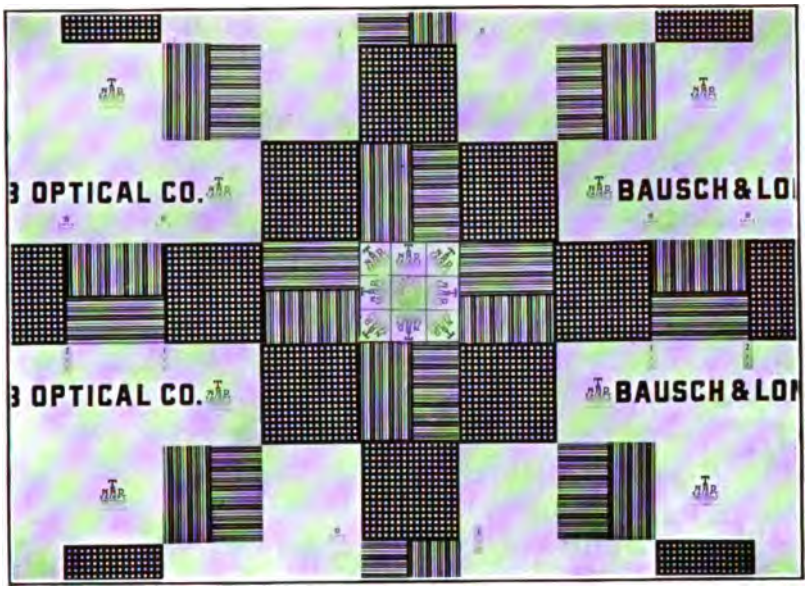
Angle of View.

The angle of view, or amount of angle that a lens will include upon a *given plate* depends entirely upon its equivalent focus. For instance:—take a number 6 series II B Tessar. This lens has an equivalent focus of 8¼ *inches.* If used on a 3¼ x 4¼ plate it would be a decidedly long focus lens. On a 4 x 5 plate a slightly long focus lens. On a 5 x 7 plate a medium angle, just right for all-round work, in fact an "all-round lens". On a 6½ x 8½ plate a slight wide angle. On an 8 x 10 plate a medium wide angle. On a 10 x 12 plate an extreme wide angle.

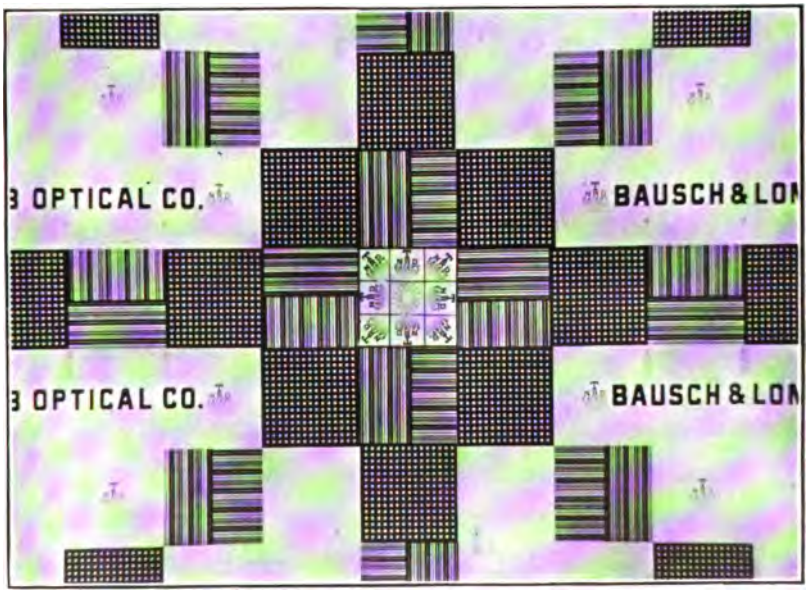
To further explain:—Take a 5 x 7 plate as the *positive* factor. With this plate a lens of 4⅜ inches focus would give a wide angle. A lens of 6½ to 7 inches a medium wide angle. One of 8¼ inches focus a "just-right" angle for the "all-round lens". A 9 or 10 inch equivalent focus lens a slight long focus; and, anything of 11 inches or more a decided long focus.

Speed of a Lens.

The speed of a lens depends entirely upon its aperture *in proportion to* its focal length. The diameter alone or the equivalent focus alone mean nothing so far as *speed* of a lens is concerned, but solely the *relation of one to the other.*



Photograph of section of test chart made with a Zeiss Anastigmat Lens. Protar series at full aperture F. 6.3.



Photograph of section of test chart made with what might be called a very good *ordinary* lens but NOT a high grade Anastigmat. This photograph clearly shows the following faults or defects:—Astigmatism, curvature of field, coma, distortion, etc., resulting in very poor covering power with almost no detail at the edges.

Reproduced from 5x7 contact glossy Velox prints. The above two illustrations not made by The Author.

Two lenses of the same diameter may be of different maximum speed and on the other hand two lenses of different focal lengths may be the same speed.

Take two lenses of one inch diameter. The first, four inches focus; this works at F. 4. The other, eight inches focus; this works at F. 8. Both lenses the *same diameter*, but one exactly four times faster than the other!

Now take two more lenses:—The first is sixteen inches focus and two inches in diameter. This works at F. 8. The other lens eight inches focus and one inch diameter. This also works at F. 8. In this case both lenses the exact *same speed* but one lens just *twice* the focal length of the other.

What are the "U. S." and the "F" systems of diaphragm marking?

One day not long ago a great big bright looking fellow called at our office and in the course of conversation, lenses were discussed. He remarked: "Can you tell me what is the difference between the French and the United States systems of stops?" At first I could not imagine what he was getting at. "Why the 'F' and the 'U. S.' markings," he said. "That means the French and the United States, does it not?" Well, do you know, that struck me as being such a good joke that I could scarcely keep from laughing. Finally the smiling mood subsided and I endeavored to explain that "F" meant "Factorial" and that "U. S." indicated the "Uniform System." "Why, Great Scott," he replied in astonishment, "I never knew that." Absurd as it may seem, that is just about as much as the average user of the camera knows about diaphragm markings.

The "Uniform System" of markings is a series of numbered stops beginning at 1 and running to 512 in simple multiple: (1, 2, 4, 8, 16, 32, etc.). No. 1 is equal to F. 4 and means that the aperture of the lens is one-fourth of its equivalent focus. Each succeeding stop so computed so as to require exactly *twice* the exposure required by the ***preceeding*** stop in order to give the *same* exposure upon the plate or film. Example: an exposure of one second at U. S. stop 4, another two seconds at U. S. stop 8, and a third four seconds at U. S. stop 16 would give the *same* exposure on each of the three plates.

The Ocklawaha River, Florida.

Bausch & Lomb Zeiss Tessar lens, series I C—8¼ in. focus. 4x5 Graflex camera. Exposure $\frac{1}{125}$ second, ***full open*** F 4.5. Focal-plane shutter. After 4.30 P. M. latter part of February. Grey light, very heavy shadows. Seed L Ortho plate. Reproduced from 16x20 enlargement, Royal Bromide paper, sepia toned.

The "Factorial" system is, as its name implies, factorial or a series of factors denoting or telling the maximum as well as the relative speeds. It is based entirely upon the aperture *in relation to* the equivalent focus. For instance F. 4 means that the aperture, or rather, that the diameter of the volume of light passing through the lens is exactly one-fourth of its focal length. F. 8, that the aperture is one-eighth of its equivalent focus, etc. However, in computing the "F" system for lens markings care has been taken to have them, so far as possible, in exact relation, or in other words, *equal* to those of the Uniform System.

The Relation of "F" to "U.S." and Computing exposure with the same.

The following table gives the exact relation of one system to the other and the comparative exposure as well:

F. 4.	=	U. S.	1.	(x)	Relative exposure		1.	second
F. 4.5	=	U. S.	1.3		"	"	1.3	seconds
			Maximum Aperture I C Tessar.					
F. 5.	=	U. S.	1.6		Relative exposure		1.6	"
F. 5.6	=	U. S.	2.	(x)	"	"	2.	"
F. 6.3	=	U. S.	2.4		"	"	2.4	"
			Maximum Aperture II B Tessar, VIIa Protar.					
F. 8.	=	U. S.	4.	(x)	Relative exposure		4.	"
F. 11.	=	U. S.	8.	(x)	"	"	8.	"
F. 12.5	=	U. S.	9.6		"	"	9.6	"
			Maximum Aperture VII Protar.					
F. 16.	=	U. S.	16.	(x)	Relative exposure		16.	"
F. 18.	=	U. S.	20.3		"	"	20.3	"
			Maximum Aperture V Protar.					
F. 22.	=	U. S.	32.	(x)	Relative exposure		32.	"
F. 32.	=	U. S.	64.	(x)	"	"	64.	"
F. 45.	=	U. S.	128.	(x)	"	"	128.	"
F. 64.	=	U. S.	256.	(x)	"	"	256.	"
F. 90.	=	U. S.	512.	(x)	"	"	512.	"

Those marked (x) indicate the consecutive U. S. stop markings.

A little study of the above table will show that both systems are, as it were dovetailed one into the other, and after it is once understood that all of these stop markings are *relative* it will then be a very simple matter to compute various ex-

"Buster"

Reproduced by special permission.
Photograph 1908, by Austin K. Hanks.

Made with B. & L. Zeiss Tessar, series I C—8¼ in. focus. 4x5 Graflex Camera. Exposure 1/30 sec. Stop F. 6.3. About 10.30 A. M. August. Bright light. Seed L. Ortho plate. Reproduced from an 8x10 contact Platinotype print worked over with "Gum." From an enlarged negative. **Note.**—This was enlarged from a small section (about 1¼ x1⅝ inches) of the original negative.

posures and comparative exposures, notwithstanding what lens be used on its make, providing, of course, that the markings as engraved are accurate and correct. The *same* exposure *always* holds good at a *given* "F" or "U. S." stop regardless of the series or type of lens.

Size of Image at a Given Distance.

The size of the object or objects upon the ground glass (or upon the sensitive surface of the plate) at a *given* distance depends entirely upon the focal length of the lens. Refer to paragraph "Angle of View." Also to paragraph regarding series VII Protar, and to use of telephoto in section IV.

Depth of Field.

This is perhaps more commonly referred to as "depth of focus." There is probably no one property or quality of a lens which is so generally misunderstood as is "depth of field." How often you hear some person say, "What wonderful depth that lens has." or "That lens has not nearly so much depth of focus as so and so." "Depth" is *purely an optical property* and has nothing whatever to do with the type or make of a lens. It depends solely upon two factors: First aperture; second focal length. The *longer* the focus and the larger the aperture, the more shallow the "depth." An F. 4.5 lens has of necessity less depth than an F. 6.3 for the reason that the maximum relative aperture is larger, but stop an F. 4.5 lens down to F. 6.3 and the "depth" will be *identical* providing the two are both the same focus. To say that a lens of a *given* aperture and *a certain focal length* has more "depth" than another lens of identically the same aperture and focus is positive folly. It cannot be so. What is "depth?" A definition in common every-day language would be: the distance between two points away from the camera which will be rendered with good definition. Or, the distance beyond a certain point which will show good detail on the plate or film. For instance, focus on an object 8 feet away from the lens, use a 3a Kodak and a 6⅞-inch lens at F. 6.3. Everything *between*, say 7 and 10 feet away will be rendered sharp. That is the "depth" for those specifications. Take the same and stop the lens down to F. 8 and the depth

A Fifth Avenue Residence, New York City.

Made with B. & L. Zeiss Protar, series VIIa—13 in. focus. 8x10 Cycle Graphic Camera. Exposure $\frac{1}{5}$ second. Stop F. 16. About 3 P. M. June. Bright light. Seed Non-Halation Ortho plate. Reproduced from contact Platinotype print.

will be greater and so on. Now, take the same camera and lens at F. 6.3 and set the lens at infinity (100 feet on the lock scale) and everything beyond about 80 or 85 feet away will be shown with perfectly good definition. That is the "Depth." Of course, it is possible with two lenses take a 3a Kodak and R.R. lens at F. 8 (full open) and another 3a Kodak with Tessar lens stopped down to F. 8, both the same focal length, that one will give better *detail* than the other, but the *relative* "*depth*" will be the *SAME.* Detail or definition is a property of lens construction and quality, but "depth" is an *optical property* and with *any* number of lenses of the same focal length and same aperture, *must be the same.*

Equivalent Focus.

The focal length or equivalent focus of an anastigmat is commonly supposed to be the distance from the centre of the barrel or diaphragm of the lens to the ground glass when focused at infinity—an object at a great distance away (500 or more feet). While this is *not* accurate it is perhaps for all general demands sufficiently so to answer the purpose.

To accurately ascertain the *equivalent focus* of a lens: first, focus upon some object (preferably a definitely *measured* section or part of a test-chart) and so gauge the distance that the camera is away, so that when the image is perfectly sharp, that will be the exact *same size on the ground glass* as it is in reality. After this has been done, carefully measure the distance between the ground glass and the front board holding the lens. Now, secondly, focus upon some distant object (500 or more feet away) so as to get a perfectly sharp image and again measure the distance between the ground glass and the front board holding the lens. The *difference* between these two focal points (the two positions of the ground glass) is the equivalent focus.

Back Focus.

The back focus is the distance from the rear surface of the lens to the ground glass, when focused at infinity (when a distant object is focused so as to show good definition).

Keep a Lens Clean.

This is *all important.* A lens, particularly a high-grade anastigmat, should always be clean. For this purpose use the fibrous lens tissue or a very old and clean pure linen rag or handkerchief. If there has been a deposit due to condensed moisture on the surface, or a finger mark, a slight blowing of the breath is permissible followed by very careful wiping with either of the above materials. Never use a silk handkerchief or a piece of chamois.

Kodak Film Tank.

The "Kodak" tank and Kodak *method* of developing either films or plates is most excellent and always worthy of serious consideration. When properly and carefully handled the results are beyond question. The fact that it is "daylight all the way" makes this method of negative development of particular interest to those who have no access to a well-equipped dark-room or for those who do not care for the charms of work by a ruby light. This method of development is so simple and the instruction booklet so complete that no further remarks are required.

Enlarged Negatives.

Making 8x10, 11x14 or larger negatives from small ones, for the purpose of making large *contact* prints on Platinotype, Carbon or "Gum," is a most fascinating process and worth all the time and expense required. For those who are truly "photo enthusiasts" this is a most charming method of occupying one's time, especially upon dark or rainy days or during the winter season.

An enlarging and reducing camera, or a good bromide-enlarging apparatus, also a few large trays and a large printing frame, are, of course, required accessories. The process, however, is rather simple and certainly most enjoyable.

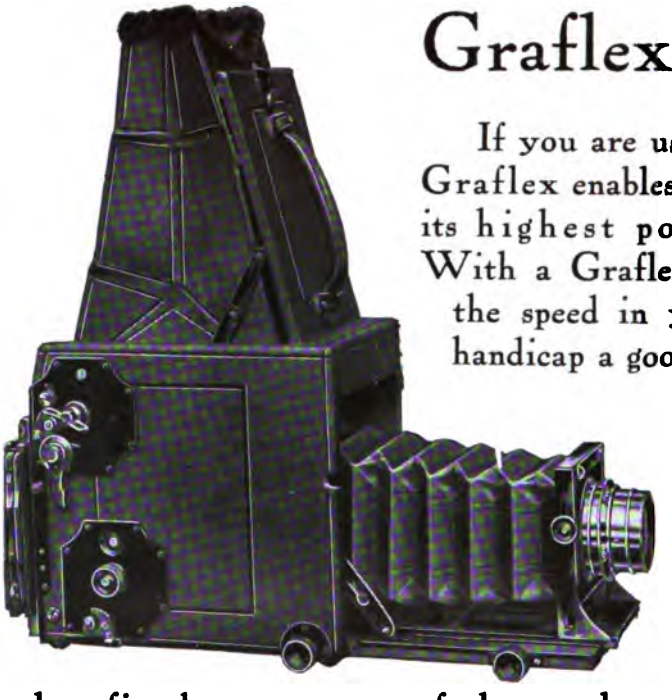
First a positive is required. These may easily and quickly be made (by contact with the original negative) in the same manner as making velox prints, only using a very short exposure by some artificial light (not too strong) and developing by a single ruby light in place of orange.

After the positive has been made and is dry (having been carefully cleaned) the enlarged negative is made by projection. This may successfully be done either with a first-class bromide-enlarging apparatus, or with an enlarging and reducing camera. A fairly small stop in the lens should be used (F. 16) so as to not require too short an exposure and an absolutely even illumination over the field of the large plate must be obtained. The development is much the same as for developing bromide enlargements. Take 16 ozs. (1 pint) of "stock developer" (full strength) and dilute with an equal amount of water and add fully one fluid drachm of 10% Bromide of Potassium. Be careful not to over-expose or to under-expose in making enlarged negatives. A full *normal* exposure is the rule, taking care in development so as to keep both highlights and shadows clear (free from "fog" and with plenty of detail) and do *not* develop too far, so as to produce a hard or contrasty negative. The use of "Seed 23" plates are recommended for both contact positives and enlarged negatives.

Where retouching is desired or required, or where a maximum amount of detail must be retained, then a direct *large positive* made by projection, and a subsequent *large negative by contact* is sometimes very desirable. The only disadvantage to this is expense, as, of course, two large plates are needed instead of one.

Travelers Palm, Mayaguez, Porto Rico.

Made with B. & L. Zeiss Tessar, series II B—8¼ in. focus. 5x7 Cycle Graphic Camera. Exposure $\frac{1}{25}$ second. Stop F. 8. Volute shutter. About 10 A. M. February. Bright sun. Seed L. Ortho plate. Reproduced from contact Platinotype print.



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